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CANADIAN

ARCHITECT AND BUILDER

VOL. XII

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1899:
THE C. H. MORTIMER PUBLISHING COMPANY OF TORONTO, LIMITED,
TORONTO, CANADA.

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CANADIAN ARCHITECT AND BUILDER.

VOL. XII.—No. 1. JANUARY, 1899 PRICE 20 CENTS. $2.00 PER YEAR.

—THE—

CANADIAN ARCHITECT AND BUILDER,

A Monthly Journal of Modern Constructive Methods,

(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD).

PUBLISHED ON THE THIRD WEDNESDAY IN EACH MONTH IN THE INTEREST OF

ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

The C. H. MORTIMER PUBLISHING CO. of Toronto, Limited, Publishers,

Confederation Life Building, - TORONTO, CANADA.

Telephone 2362.

Branch Office: NEW YORK LIFE INSURANCE BUILDING, MONTREAL.

Bell Telephone 2299.

SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to foreign subscribers is $2.50. Subscriptions are payable in advance. The Journal will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrears of subscription paid.

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Prices for advertisements sent promptly on application. Orders for advertisements should reach the office of publication not later than the 12th, and changes of advertisements not later than the 5th day of the month.

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Contributions of value to the persons in whose interest this journal is published are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

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The Ontario Association of Architects.

THE annual convention of the Ontario Association of Architects seems to promise some result. The fulfilment of the idea with which the Association was founded, that of making the title "Architect" a degree attainable only by an educational process, was for many years considered to be only deferred for a time; but it seems that there is no near prospect of legislation effecting this end. If the Association is to exist at all it must exist as a voluntary Association, and to those members of the profession who are unwilling that it should cease to exist the idea of a voluntary Association seems to be pleasing enough. The intercourse with each other and exchange of ideas and information, which constitute the main motive of such an Association and are necessary for its life, shonld, if effectively carried out, be very profitable to its members. But it is no light task to make a success of such an Association among a body of hardworked professional men, who have little time to think when the preparation of a really interesting paper means the expenditure of much time in thought. Yet such things come by practice and the Association is most likely to succeed by boldly launching upon a career of monthly meetings for the discussion of professional subjects. One meeting a year will not fulfil the purpose of a voluntary association in this respect. It would be, of course, necessary to have a sub-committee devoted to procuring the papers for these meetings, and it would be necessary for this committee to be beforehand with its work and arrange for papers a long time before their delivery. If this is done not only will the busiest man have some time for the preparation of his paper, but the principal function of a paper is more likely to be fulfilled. The principal function of a paper is to deal, not with ideas, but with facts. When a scientific man reads a paper upon an eclipse of the sun, an earthquake, or even the brief passing of a tornado, he recites not what he thought or felt but what he said; and an artist among artists or a constructionist among constructionists will similarly give them best

what they want to know by giving as few personal opinions as possible and as many facts—what proceeding, either in construction or decoration, produced what result. To accumulate facts of this kind for a paper, it is desirable that the subject should be determined as early as possible in the year in which it is to be delivered; that the mind may, as it does when there is a necessary topic of thought lying in it, receive impressions from what the eye would otherwise look at without heeding. It is in this way that original papers are made, and it is this process that repays the paper reader, for, however much he may impart to others, he acquires more himself.

Among the other suggestions as to what the Association might do, that of presenting a medal in recognition of merit in design is interesting, and may be worked out. There is evidently a great setting of public taste on this continent in the direction of architecture. Something in the way of municipal recognition of good design is already being talked of. It is perhaps early yet for us in this province to regard with reverence a municipal stamp of approval upon an architect's work, but the approval by architects of the design of one of their number may be regarded as a correct pointer to merit; and it is probable that in the growing state of public interest in architecture such distinction for an architect would attract attention and be of solid value to the recipient.

The proposal that members of the Association should take the title "Registered Architect" seriously and adopt it for their letter heads, etc., seems a good one. As was pointed out in the Convention by the turn things have taken, this title has now some merit as a distinction. Its adoption will certainly help the esprit de corps of the Association, and it may be a professional advantage to those who are entitled to use it. There seems no reason to suppose that the title "Architect" will become debased in this province by the preference thus given to a combination title; for, in the adjacent province and in the neighboring state, where the distinctive title of the profession is given a legal force greater than that which will attach to the title "Registered Architect," it is the old and proper title "Architect" which is employed; and there are indications that the initiative thus taken will be followed in other states before long.

The Eight Greatest Facades.

A RECENT voting contest was held by the readers of the Brochure Series of Architectural Illustration to determine which were the eight greatest facades in the world. The "greatness" was to be considered from a purely architectural point of view, not from that of historio or other interests. No limitations of style or period were imposed. The contest resulted in the choice by consensus of the following facades, the order of preference being indicated: (1) Notre Dame Cathedral, Paris; (2) The Parthenon, Athens; (3) The Opera House, Paris; (4) St. Mark's Library, Venice; (5) St. Peter's, Rome; (6) Ameins Cathedral; (7) The Farnese Palace, Rome; (8) The Ducal Palace, Venice. It is curious and interesting to find in this list of the eight greatest facades in the world that the three first are examples of the three classes of design into which architecture may be divided. The first is the contructional style, in which construction forms the motive and the parts are proportioned only with regard to their function. The second is the style which proportions its parts in conformity to abstract beauty rather than to the bare necessities of construction. The third class is architecture in which the motive is display. It is a hopeful sign that, in a country which is developing new methods of construction, the first place should be given to a great example of the style which succeeded in developing beauty at the same time as it developed scientific construction. The other examples in the list are, with the exception of Amiens Cathedral, of a mixed character, and have less significance for this reason. If influence on subsequent work is a test of greatness, the Farnese Palace as the leading example of the type which has begotten the modern tin cornice is well placed; but it seems an easy triumph, and one would have thought the Ducal Palace, though it has had so little influence in comparison, should have been ranked above it.

Effect of Frost on Cement Mortar.

MR. A. O. Hobart, Fellow of Civil Engineering of the University of Illinois, draws from a series of recent experiments the conclusion that cement mortars, made either with natural or Portland cement, if frozen in the presence of water, are likely to be disintegrated and destroyed; but that, if extraneous moisture is kept away from them, natural cement mortars, if allowed to set from three to six hours, are improved by subsequeut freezing; while mortars of Portland cement, under such circumstances, lose strength, particularly when mixed with a large excess of sand. Moreover, while mortars of natural cement usually suffer a slight surface disintegration by freezing, although the total resistance of the briquette is greatly increased, briquettes of Portland cement mortar show no change on the surface, although their strength may be almost entirely destroyed.

TORONTO CHAPTER OF ARCHITECTS.

THE regular monthly meeting of the Toronto Chapter of the Ontario Assocation of Architects was held at the School of Practical Science on Monday evening January 9th. The attendance was not up to the average owing to the prevalance of la grippe amongst the members. Those who did turn out however enjoyed a very interesting evening. The annual report to the Association was read and approved. Mr. J.W. Gray read a paper entitled "Some Notes on Tall Building Construction," which was attentively listened to and fully discussed. The balance of the evening was spent looking at lantern views which were thrown on the sheet under the management of Mr. Wright and Mr. Harkness of the school. A cordial vote of thanks was offered to all these gentlemen. The chair was occupied by the Vice-Chairman Mr. F.S. Baker, in the absence of the Chairman, Mr. G. Helliwell.

In the course of excavations necessary for the putting in of the foundations of a villa to be erected near Hammersmith Bridge, Eng., there has been found, some 9 feet below the surface, the paved floor of a Roman villa. The design of the pavement consists of half-circles, circles, and triangles, bordered with what would appear to be geometrical patterns or figures. In the area of the circles are depicted leopards and sea-dragons pursuing dolphins. In the centre compartment are what appear to be dogs chasing foxes. In the spaces between the circles and the triangles are drawings representing the heads of Neptune, Venus, Jupiter, Mars, etc, Another design, in remarkable preservation, is believed to represent Actæon attacked by his hounds. There are also heads of Flora and of Ceres, Silenus mounted on an ass, a fine head of Medusa, and a vine-leaved Bacchus. These tiles are laid upon a bed of concrete supported upon brickwork, which again, in its turn, rests upon rammed-down clay.

CHARACTER IN MATERIAL.

IT was asserted in the October number of this journal that the indefinable but attractive quality which in literature we call Style, exists in architecture also; not in following any of the historic manners which we call the styles, but in the enjoyment and expression of the three practical bases of architecture, plan, construction and material. In the November number, the essential character of the building was said to reside in the plan. In last month's number, the life of the design was found in its constructive needs. We come now to consideration of the intimate connection between good detail and perception of the limitations of the material in which it is wrought. The snare of the imitative designer, who works from a model, is that he is working from outside, and is often found to be forcing upon the material he is obliged to use conditions, belonging to that used in his model. To pattern a wooden erection after a stone example, is no more good design than were the early Greek stone imitations of wooden construction. An original designer works the other way, from within outward, and finds in the requirements of plan, in the necessities of construction, and finally in the limitations of material, suggestions for form and opportunities of beauty.

It does not seem at first sight as if much success would attend the process of decorating a window with a figure subject in colour, made by piecing together, by means of lead strips, pieces of coloured glass somewhat imperfectly matched and roughly blended. But it has been found that due regard for these limitations and the fact of transparency, transforms them from hindrances to the very source and ground-work of beauty. There is no limitation which is not a source of beauty. The discovery now applied to luxfer prisms, that glass quarries can by the electrical deposition of metal between the joints, be set true to a plane, instead of, as in leaded work, at slightly varying inclinations to the light, will be no help to coloured windows if applied to them; the very variation of the greets in coloured work is one source of richness in the colour, and for plain leaded work, as in the ordinary diamond pane, it is the source of the variegated gleam which makes these windows so picturesque on the outside. This is an illustration of a principle, which applies equally to all materials: mechanical skill displayed in overcoming the conditions of a material, whether in refining them out of sight, or in making the material imitate the conditions of some other material is fatal, both to the workman who thereby ceases to be an artist, and to the work which thereby ceases to be a work of art.

Not only the short road, but the only road to good architectural detail is to work with the material and try to bring out its qualities. Wood as we use it, is a thin material from one to two inches thick as a rule. It is possible by means of raking mouldings and other processes of building up, to confuse this characteristic with the characteristics of other materials, and thereby lose one essential of beauty in design by losing the character of the material. Wood thus built up, may be said to look like wood of greater thickness, but it does not. In the first place it comes to be used in places where such thick pieces would be out of place, and the eye that is satisfied with the appearance so made, is an eye which has lost perception. But even the inexperienced eye misses the variation in grain, and the small fissures which are the marks of solid woodwork and which the eye enjoys without knowing why in old work. A certain eminent writer of Boston, who cautioned his architect's superintendent, "Do not let any fool of a painter fill up the cracks in my ceiling beams," showed a refined appreciation of the beauty of character in material. Built beams if near enough to the eye to be clearly seen, show the neatness of cabinet work, and that which in its proper place is refined gives here a curious impression of vulgarity. The same may be said of the shining surface which is now disappearing from fashion, as the proper finish for constructive wood work. We like our polished mahogany dining table whose hard and glassy surface looks perpetually clean, and there are other circumstances in which wood that takes a polish should be polished, but the "hard oil finish" that has spoiled the colour and surface of so much good hardwood, and will keep it spoiled, is happily out of date with architects of taste.

Brick is a material of universal use, and one might perhaps say, capable of universal application if its conditions are studied. The opposite poles of its application are the enormous brick fortresses of Spain, and the commixture with stone in some of our city buildings, where there is so much stone trimming that the constructive lines are practically stone, and the brick becomes a mere surface for the spaces between. The walling of Spanish fortresses is of long thin brick with joints not less than an inch thick. Even in photographs the texture of the walling in such large masses delights the eye, and when we imagine the soft and varied colour that must be given to the brick by the large admixture of mortar, and the roughness of the joints, we see that this is the perfection of plain brick-work on an extensive scale. Build the same masses in pressed brick and the result would attract no artist. On the other hand, we could not fill in between the stone work of a first-class city building with brick-work of the old Spanish character. There is some indication here of a scale of limitation in brick-work, corresponding to the scale of fineness in the buildings in which it is employed. It is rather the character of what it is perhaps least invidious to call "swellness" in a building that limits the use of brick rather than its real dignity. The beautiful but slightly "swell" brick and marble Renaissance front with which Sir Christopher Wren so skilfully hid the whole of Cardinal Wolsey's building at Hampton Court is still beautiful, but has an undeniable air of shabbiness—a shabby gentility that does not at all affect Wolsey's far older building. This portion, which pretends to no greater dignity than a large comfortableness, and no finer beauty than can be executed in brick, still remains dignified and beautiful. For a building that should give evidence of wealth, brick is out of place. Brick, which is the poor man's material, must diminish and finally disappear, in proportion to the wealth of which the building should give evidence. Stone is always in place. Designers seldom go wrong in stone as far as considers the character of the material, and there is a mechanical and infallible guide to the scale of quality in the scale of cost.

Of material that is difficult to handle and that is often mishandled, perhaps iron has the least settled treatment and offers most field to the original designer. The problem would be easier if cast iron were holding its own. The purist objections that have been raised to cast iron should have been directed, not against the material but against the manner of casting it in imitation of other material. That iron can be cast is enough reason why it should be cast, and suitably moulded or modelled details are an easy task to the designer, since variations from stock cost but little to execute. But rolled iron, which we can only afford to use as manufactured on a large scale, offers difficulties on this account. There are, however, pleasing instances of open beam work, adorned only by ornamental bolt heads and angle connections. If wrought iron might be always exposed, the best advice that could be given to the designer would be to expose it and learn from experience how it can be made beautiful, and how beautiful it can be made. But the question with wrought iron is not so much how to expose it as with what to conceal it. It seems, from papers that have been read about steel building, that the problem of protecting a light structure of iron in a characteristic manner is, in spite of the hurry of practice, not absent from the minds of modern designers.

Whatever is done in this direction with good result must be the outcome not of imitative design but of an artistic appreciation of the imaginative quality that inheres in a building definitely planned for definite needs, of the vigor given by clear constructive lines and of the interest that lies in the characteristic application of material.

BUILDING OPERATIONS IN 1898.

In reviewing a year ago the Canadian building operations for the year 1897, which it may be remembered were of a disappointing character, the opinion was expressed that 1898 would probably show to better advantage. This opinion is verified by the reports to hand of the results of the year which has just closed. The extent of building enterprises is properly regarded as being a reliable barometer by which to measure the commercial condition of the country. Early in 1898 a substantial improvement began to be manifest in all branches of business. This improvement continued throughout the year. In sympathy therewith the building industry took on a degree of activity such as it had not previously experienced for several years. The revival was not confined to one or two particular localities, but extended to most of the leading cities in all the provinces of the Dominion. In Toronto, where for six or seven years unusual dullness had prevailed, the improvement was especially noticeable. The greater number of the buildings erected were residences of the better class. True, prices were much too low to allow of a fair margin of profit to contractors, the bulk of advantage being therefore reaped by the workmen, but should the improved conditions continue during the present year, as there is reason to anticipate, it may be that prices will advance to a more equitable standard.

TORONTO.

The returns of building operations for 1898 as compiled from the official records, show the expenditure to have been almost double that of the previous year. There were issued during last year 562 permits, totalling in value to $1,701,630, against 396 permits in 1897 with an aggregate value of $951,130. In 1897 the average value of the permits issued was $2,402, while the average value of those issued in 1898 was $3,026. The classification of the buildings represented by these permits is as follows:

No. of permits.		Amount.
161	Brick dwellings	$489,600
132	Brick dwellings, alterations and additions	83,585
35	Roughcast dwellings	29,350
53	Roughcast dwellings, alterations and additions	15,740
32	Stores and offices	115,500
51	Stores and offices, alterations and additions	43,230
33	Factories	267,500
25	Factories, alterations and additions	92,665
23	Warehouses and additions	211,200
7	Churches and additions	23,600
15	Schools and additions	124,300
3	Colleges	57,200
7	Hotels and additions	54,200
2	Theatres and additions	27,200
2	Banks and additions	13,000
1	House of Industry addition	15,000
37	Stables and sheds	34,760
1	Hospital addition	4,000
	Total, 1898	$1,701,630
	Total, 1897	951,130
	Increase for 1898	$750,500

The principal increases are in dwellings, for which the value of permits issued was $618,255 this year, against $439,005 last year; in warehouses, in which there is an increase from $71,700 to $234,800, and in factories, which show an increase of from $80,770 to $360,165, over 400 per cent. The operations of 1898 were the most extensive of any year since 1892.

MONTREAL.

The total value of buildings erected during the year is placed at $1,729,150, as compared with $1,414,300, in 1897, showing a gain of $350,000. The buildings erected are classfied as follows:—669 dwellings; 18 stores; 6 manufactories; 2 theatres; 1 hospital; 2 skating rinks; 4 churches. It is subject for regret that it has not been possible to obtain a more detailed statement of the year's operations. Mr. Jos. Venne, architect, reports having designed and erected the following important structures:—church for the parish of St. Eusebe, cost $20,000; church of St. Clement, cost $25,000; twelve dwellings on St. Denis S treet, cost $50,000 orphanage for the Grey Nuns, cost $60,000; alterations to church of St. Vincent de Paul, cost $4,000. Messrs. Alex. G. Fowler and J.Rawson Gardiner, gas architects, report as follows: Rebuilding mill and factory for Messrs. Peck Benny & Co., cost $23,000; additions and alterations to store and dwellings Nos. 2, 4 and 6 Victoria Street for estate of late James Allen, cost $8,000; two houses on Prospect St. Westmount; branch bank at Revelstoke B.C., and addition to bank at Sorel, P.Q., for the Molsons Bank; additions to factory King St., for the McClary M'f'g Co.; alterations to house, Park Ave., for the Rev. Archdeacon Mills, and other smaller alterarions, etc.

The report of the Westmount building inspector for the year ending November 1st, 1898, gives the whole number of buildings erected as 189, and the value thereof $825,300. There were 115 terrace houses, 10 detached houses, 19 semi-detached houses, 36 tenements, 5 stores and dwellings, a church, a public library, a public hall, and a building for municipal purposes. During the previous year there were 160 buildings erected, valued at $757,950.

HAMILTON, ONT.

The cost of buildings during the year just closed is estimated by Mr. John Anderson, city building inspector, at the sum of $426,645, being $63,723 in excess of the year 1897. The majority of these buildings were constructed of brick, the most expensive being the departmental store of Mr. F. W. Watkins, cost $60,000, Charles Mills, architect; residences for Hon. W. E. Sanford, cost $20,000, Charles Mills, architect; dwelling for Mr. A. E. Carpenter, cost $9,000, Messrs. William & Walter Stewart, architects. The details of the year's operations, as embodied in the annual report of the building inspector, are as follows:

	1897.	1898.
Number of permits issued	216	197
At a total value of	$362,922	$426,645

being an increase of $63,723 over the expenditure of the previous year.

Description of permits.	1898. Number.	1898. Value.	1897. Number.	1897. Value.
Brick dwellings	137	$189,540	109	$163,910
Frame buildings	8	6,185	9	6,600
Alterations to buildings	72	34,685	72	41,127
Factories, stores, etc.	42	196,235	35	151,285
Total	259	$426,645	225	$362,922

QUEBEC, QUE.

The expenditure on buildings and public works in this city during 1898 was about 100 per cent. greater than in the previous year, the total being estimated at upwards of half a million dollars, divided as follows: Civic improvements, including opening, widening and prolonging of streets, paving with stone and asphalt, wharves, pontoons, parks, etc., $310,000; sidewalks of wood, stone, brick, cement and asphalt, $15,000; drainage and water works, $54,000. The buildings erected consisted of first class stone and brick public and private structures, about 20 per cent. being for residence purposes, 40 per cent. for business purposes and 40 per cent. for public use. Eighty per cent. were constructed of brick, eighteen per cent. of stone and only two per cent. of wood. The principal structures erected were: A wing to the Chateau Frontenac, cost $150,000, Bruce Price, architect; St. Sauveur church, cost $10,000, Tanguay & Vallee, architects; exhibition buildings, cost $50,000, J. F. Peachy, architect; Grey Nun's building, cost $35,000; government emigrant sheds and freight sheds, cost $10,000; Telephone Exchange, cost $20,000, D. Ouelette, architect; Y. M. C. A. building, cost $20,000, J. F. Peachy, architect. Prices of materials were slightly in excess of the previous year. Prices for labor were as follows: Laborers, $1 to $1.20; masons, $2; stone cutters, $2 to $2.50; joiners, $1.50 to $1.75; bricklayers, $2.50 to $3. Cost of street work was as follows: Granite sets resting on six inch concrete, $3.37 per superficial yard. Contract prices for the current year are as follows: For asphalting and six inch concrete, $2.40 per superficial yard; scoria brick paving, $3 per superficial yard; 9" x 12" curbing, $1.67 per lineal yard. Mr. D. Ouelette, architect, reports having carried out work during the year in various parts of the province outside of the city to the value of $252,000, and to have work in hand for the present year in the city and the adjoining town of Levis amounting to upwards of $300,000.

VANCOUVER, B. C.

The total expenditure for new buildings during 1898 is placed at about $1,500,000, a sum considerably in advance of any previous year. The cost of buildings for residential purposes was about $900,000 and for business purposes $600,000. Among the most important buildings erected were the C. P. R. station, cost $150,000, E. Maxwell, Montreal, architect; Bradbury & Brown, contractors; the Molson's Bank constructed of stone, approximate cost $100,000, Messrs Taylor & Gordon, Montreal, architects, Thomas Tompkins, contractor; the Imperial Bank, (stone) G. W. Grant, architect, David Bain, contractor; the DeBeck block, Fairfield block, Prior building, Shinner building, Thomson building, Rodgers block and the McClary building from plans by Messrs W. T. Dalton, Parr & Fee, William Blackmore. C. O. Wickenden, W. H. Mallory, E. H. Whitehead, N. Hoffer, S. McClure, Mr. Soule, C. Oldershaw and Messrs Moore & Henry of London, Ont. Prices of materials were about 20 per cent higher than in 1897, and prices of labor were also in advance of the previous year, added to the fact that mechanics were more steadily employed. The present indications go to show that operations during the present year will be on a scale equal at least to that of 1898, as dwellings and business blocks are well occupied. There is said to be, however, sufficient skilled and unskilled labor on the market to meet all requirements.

VICTORIA, B. C.

Buildings operations during 1898 were on a restricted scale, the total expenditure within the city limits, and exclusive of Provincial Government or Dominion Government buildings, being placed at about $140,000. The only building of importance erected during the year was the block of stores and warehouses for Messrs Weiler Bros. costing $40,000, T. C. Sorby, architect, Smith & Sherbourne, contractors. A considerable amount was expended on the completion of the Provincial Government buildings of which Mr. F. M. Rattenbury is the architect, and on the Government post-office. Beyond this the bulk of the work consisted of small residences costing from $1,500 to $2,500 each. Prices of materials changed but little. Lumber is reported to be still too low in price for a fair margin of profit. Prices of labor were fairly well maintained as the busy building operations at Vancouver kept all hands well employed. The indications for the present year point to a fair amount of residence work of the better class, but a small number of business buildings. Real estate agents report that rents and interest are paid with greater regularity than for some time past, that there are few empty houses and no empty stores, and that there is a tendency in the direction of recovery in real estate values in suburban districts. Mr. F. M. Rattenbury has on hand a considerable amount of work at outside points, including pressed brick and terra cotta banks for the Bank of Montreal at Rossland, cost $40,000; Nelson, cost $30,000; New Westminister, cost $19,000. Also brick business blocks to be utilized by the Bank of British Columbia at New Westminister, cost $18,000.

ST. JOHN, N. B.

Mr. M. W. Maher, inspector of buildings, places the total value of new buildings erected within the city during 1898 at $182,990, divided as follows: Brick and stone buildings, $64,800; wood or cased buildings $118,190. These figures show a total advance of $60,000 above 1897. Wood buildings predominated, the total number being 97 as against 11 of brick and 1 of stone. The residences numbered 55, business buildings 31, and churches 3. The most important of these buildings were a brick warehouse costing $12,000; a bakery, costing $12,000, and a stone dwelling costing $10,000. Prices of materials were about the same as the previous season, bricks measuring about 17 to the cubic foot, selling at from $8 to $10. There was no change in prices of labor, masons being paid $3 per day, and carpenters $9 to $12 per week. The interference caused to the timber trade by the Spanish-American war, is believed to have retarded building operations in this city last year. An improvement is therefore reasonably anticipated for the coming season.

HALIFAX, N. S.

Building operations were less active than usual, the total expenditure for the year being only about $600,000. There were erected 80 residences, 12 business buildings and 4 public buildings. Of the residences 76 were constructed of wood and 4 of brick. Of the business buildings, 7 were of brick and 5 of wood. The principal buildings erected during the year were, a brick warehouse for Clayton & Sons, cost $10,000, J. C. Dumaresq, architect, H. Saunders, contractor; the Pinehill College Library, brick, cost $18,000, J. C. Dumaresq, architect, Rhodes, Curry & Co., contractors; Fort Massey School, Elliot & Hopsun, architects; Morris Street School, Elliot & Hopson, architects. Prices of materials and labor were about the same as in 1897 with employment scarce, there being but few unfinished buildings on the way. The outlook for 1899 is not regarded as being a very hopeful one.

NEW WESTMINSTER, B. C.

New Westminster was swept by fire on the 10th of September last, the fire originating in inflammable buildings on the water front, and getting beyond control, swept the business portion of the city out of existence, including four churches, Post-office, Court House, etc. With true Canadian pluck the citizens immediately set to work to rebuild the burnt district, and with such good effect that at the close of the year some dozen or more substantial business brick blocks are nearing completion, as well as the law courts, Holy Trinity Cathedral, the public market and many lesser buildings. Should the present rate of progress continue to the close of '99, the scar of the great fire will be completely obliterated. Mr. G. W. Grant, architect, who designed so many of the former buildings, has been entrusted with the restoration of most of the buildings above referred to. Among other architects who are principally engaged in the reconstruction of the city are Messrs. Tiark, Sate, Guenther & VanAken, Clow & Welsh, Julien—among the leading contractors being Jas. Sayfield, J. H. Williams, R. Buckland, Alex. Cruikshank, D. Bain, G. E. McDonald, E. Burns, J. A. Colbick, Jas. Cunningham, S. G. Tidy.

LONDON.

A slight increase took place in the volume of building operations as compared with 1897. The expenditure for 1898 is placed at $275,000, divided as follows: Residential buildings, $65,000; business buildings, $50,000; public buildings, $160,000. Most of the buildings were constructed of brick. Among the most important buildings were a hospital, Bell Telephone Co.'s Exchange, Hemidge office building, and buildings for Messrs. Sterling Bros. and Gorman, Eckert & Co. Prices of materials ruled about 10 per cent. higher than the preceding year, labor unchanged. More favorable conditions are anticipated during the present year.

OTHER PLACES.

In St. Thomas, the year's expenditure on new buildings is estimated at $125,000, being in excess of the previous year. The buildings erected were principally of stone and brick, the most prominent being the city hall, Neil Darrach, architect, cost $45,000, and two public schools each costing $20,000, Long & Son, architects. Prices of materials were about the same as in 1897, with the exception of lumber, which sold at a high figure. Prices of labor were about ten per cent. in advance of the previous year. The prospects for the coming season are as yet uncertain.—The town of Galt expended in new buildings about $65,000, a sum considerably in excess of the previous year. The expenditure on residential buildings was about $25,000, on business buildings $30,000, and on public buildings $4,000. Among the most important buildings erected was a fire hall, cost $4,000; remodelling opera house, cost $6,500; factory for the Turnbull Company constructed on the slow burning principle, cost $12,000, F. W. Mellish, architect. Prices for labor and materials were unchanged. The outlook for the coming season is considered hopeful.—At Brandon, Man., new buildings were erected costing $40,000, brick and wood being the materials used in their construction. The most important buildings were the Nation block, costing $8,500; a building for Messrs. McLeod & Hanley, costing, $4,000; a double residence for Zinc Bros., costing $9,000, only the foundation of which was completed last year; a double residence for Mr. John Hanbury, cost $5,000; foundation for new Methodist church, cost $4,000. Mr. W. H. Sbillinglaw is the architect of the first four mentioned buildings, and the supervising architect of the Methodist church, the respective contractors being Messrs. Miller & Sherber, George Stinett and John Hanberry, which was designed by Mr. S. R. Badgeley, architect, and the ultimate cost of which is to be $25,000. This building will be completed during the present year. The contractors are Messrs. Spencer Bros. and T. M. Harrington. Prices for materials and labor ruled about the same as in 1897.—The total expenditure for new buildings in Collingwood is estimated at $32,000, being a less amount than in the previous year. About three-fifths of the buildings were erected for residence purposes and two-fifths for business purposes. Two-thirds were constructed of brick and one-third of wood. The most important buildings were a residence for Charles Stephens constructed of pressed brick and brown stone, cost $11,000; three brick stores, cost $9,000, and a residence for B. Westcott, cost $3,000, the contractors for the first mentioned house being the Bryan Mfg. Co., and for the three latter buildings, Messrs. Wilson Bros. The coming season promises to be about equal to last year.—In St. Catharines $50,000 was expended in building improvements, a considerable increase above 1897. The work done was almost entirely of a residential character, consisting of brick and wood dwellings. The architects connected therewith being Messrs. S. G. Dolson, W. B. Allen and A. Youmans, and the contractors Messrs. Newman Bros., George Wilson & Co., E. C. Nicholson, James Mcbride, E. Switzer, Thomas Lazenby, Robert Irwin, John Carl and H. Riddell. Prices of materials and labor were unchanged. It is yet too early to estimate the extent of operations for 1899.—Buildings to the value of $15,000 were erected in New Denver, B.C.—In Mount Forest, Ont., $42,000 was expended on new buildings.—Windsor, N.S., which was swept out of existence by fire in 1897, has been largely rebuilt, over 300 houses having been erected during 1898.—In Edmonton, N. W. T., upwards of $50,000 was expended on new buildings.—The expenditure on new buildings in Moncton, N.B., is estimated at $60,000.—North Sydney, C. B., invested $83,000 in new buildings last year; Smith's Falls, Ont., $80,000; Waterloo, Ont., $36,000; Tilbury, Ont., $25,000; Portage la Prairie, Man., $100,000; Renfrew, Ont., $35,900; Woodstock, Ont., $46,000.—In Peterborough the total expenditure on all classes of construction work totalled about $60,000—$20,000 of this amount represents expenditure on sewers and concrete sidewalks. The expenditure on buildings was about 50 per cent. below that of 1897. The buildings erected were largely of a business character, among the most important being a pork-packing warehouse, harness factory, power house, and Baptist church—the architects of which were Messrs. Belcher and Blackwell. The municipal work was under the direction of Mr. S. Belcher.

BY THE WAY.

THE name of the young lady recently admitted a member of the Royal Institute of British Architects, is Miss Ethel Mary Charles. She has just completed her term of studentship in the office of a London architect, and in addition has won several prizes for design. It is said to be her intention to open an office in a good business locality.

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MR. Chas. Baillarge, late City Engineer of Quebec makes the sensible suggestion that persons sending circular series of questions to be answered, should always send at least two copies of the blank instead of one. He says: "you must certainly conjecture that anyone answering such questions is desirous of keeping an original, or minute or copy thereof for future reference, and it is enough in the second copy of the blank to copy the answers, without having also to copy the questions. I receive scores of such circulars during the year—all city engineers do— from scores of towns and cities in Canada, the United States, etc., for information as to paving, electric lighting, hygiene, etc., and generally have to write for a second copy of the blank form."

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WE have all too few architectural landmarks in Western Canada, and can therefore ill afford the loss of any of them. The recent destruction by fire, of St. George's Cathedral at Kingston, is consequently felt throughout the province. The fire is supposed to have been caused by an explosion of gas in the furnace room. With the thermometer registering twelve degrees below zero, the efforts of the firemen and citizens to save the structure, proved unavailing. The cathedral was built in 1825, and remodelled in 1840 and 1893. It is probable that $100,000 had been expended upon it. The loss including the organ and fittings has been adjusted at $72,780. An effort is being made to raise by subscription the sum of $10,000 to be applied with the insurance money towards the immediate restoration of the building.

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To "See oorsels as ithers see us" is not always possible or even perhaps desirable, but to have our efforts fairly criticized should prove helpful. Therefore I reproduce the following from a recent number of the Architectural Review of Boston:—"In the Canadian Architect & Builder for July are some interesting half-tones from photographs of the new Legislative Buildings at Victoria, B. C., by Mr. F. M. Rattenbury. The buildings are of a simple and massive Romanesque style, not badly proportioned. In detail, however, there is an unpleasant mingling of somewhat rudimentary forms with a crude semi-classic detail (even pedimental volute scrolls appear). The Drill Hall at Quebec, by Mr. E. E. Tache, in the August number, is also of interest in its use of early French Renaissance forms: but the buttresses are weak, and if structural, as they should be, are clearly inadequate."

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A LOCAL firm of architects who recently carried to completion a small church in the suburbs of Toronto heard of a very amusing incident which took place at one of the meetings of the intelligent building committee. The architects had proposed a scheme of color for the interior which although somewhat new, seemed to them particularly appropriate to the building in hand. The committee's ideas of propriety were greatly upset thereby and much heated discussion ensued. At last an unusually bright and intelligent member made the following naive proposition, "Send for old Tom Brown who has done nothing but kalsomining in the district for nearly fifty years and color the church as he says." The intelligence of the suggestion will at once be seen when it is remembered that this old kalsominer has probably never used more than two colors in his life, and knows as much about color effect as the old tom cat. It is satisfactory to note, however, that the architects' scheme was finally carried out, though probably this would not have been consummated but for the minister of the church, who is a liberal minded and cultured man.

ILLUSTRATIONS.

BANK OF MONTREAL BRANCH, NOTRE DAME STREET, MONTREAL—ANDREW T. TAYLOR, F.R.I.B.A., ARCHITECT.

COTTAGE AT ELLERSLIE, N. S. WALES—R. M. FRIPP, F.R.I.B.A., AND G. S. GOLDSBROUGH, ARCHITECTS.

GRAND OPERA HOUSE, BARRIE, ONT.—EDEN SMITH AND EUSTACE G. BIRD, A.R.I.B.A., ARCHITECTS.

The building, which is owned by the County of Simcoe, was completed in 1896. It is isolated and used for theatrical purpose only, having no stores, etc., in connection therewith. It has accommodation for 1200 persons and is capable of hanging any travelling company's scenery. It is built on the French plan, having orchestra, auditorium, parquet, dress circle, balcony and top gallery, eight boxes, smoking, green and crush rooms.

The main entrance is so arranged as to admit all persons to any part of the theatre, but separate doors are provided for egress from each different part on termination of performances.

The acoustic properties are all that can be desired, being the effect of a plastered partition in front of the brick wall at back, but at the same time made as fireproof as possible and all angles are well curved off. The ventilation is successfully carried out by immense heated shafts on either side of the bell-mouthed proscenium arch, and connected to ducts around the curved parquet floors.

The house is lighted with one thousand electric incandescent lights, including stage lights. Those in the dome are hidden by means of staff shells which forces a reflected light from the ceiling into the auditorium.

The floor and galleries have splendid pitch and each seat is well elevated.

The gallery fronts, boxes, canopies, proscenium, arch, caps, pilasters, etc., are decorated in modelled staff in meggo-relievo, tinted in two shades of cream and picked out in gold. The dome and walls are frescoed in warm tints, and all dados throughout the building are finished in stained burlap, which gives a cosy appearance.

The stage proper is 60' x 35' and fifty feet to gridiron (the latter is complete with forty-five runs of lines), has flymen's galleries, bridge-pallette, etc. The electric switchboard, including dimmers, &c., on the stage, controls the whole lighting system throughout the building.

There are ample artists' and public dressing rooms, lavatories, &c. The facade is of Spanish design.

The following contractors executed the respective works: James Barbour, Toronto, carpentry; Stapleton & Son,, Toronto brickwork, &c.; W. J. Hynes, Toronto, ornamental and general plastering; Pease Furnace Co., Toronto, heating and ventilating; J. Woodburn, Toronto, rigging loft and switch; J. P. Davis, Chicago, scenery and frescoe work; P. J. Moore, Barrie, plumbing.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

AN INTERESTING LEGAL DECISION.

A CASE of considerable interest to architects, owners and contractors, was decided by Mr. Justice Curran in the Superior Court in this city on the 28th ult. The plaintiff, Collins, a contracting carpenter brought an action against one Lapierre for $330. He alleged that on the 5th of August, 1897, he made a contract with defendant to do all the carpenter work on a block of houses in Laprairie street in this city, under plans and specifications. The contract price was $2,020. He claimed that he faithfully performed all the work as specified. Defendant, he alleged, paid him $1,765 on account, leaving a balance of $225. In addition the plaintiff claimed $75 for extra work done for defendant independent of the contract, making $330, for which he asked judgment. Defendant pleaded that it was true he entered into the contract alleged, but he denied that plaintiff did the work according to the plans and specifications. On the contrary, he alleged that after plaintiff pretended to have finished his work, he was obliged to protest him notarially, and that he put him in default to do a number of things mentioned in the contract which had been omitted, and to change others which had been done in a totally different manner from that specified. He set forth that under the contract he was to pay 85 per cent. upon the contract price during the progress of the work, and was to be privileged to retain 15 per cent. until the expiration of thirty days after the full completion of the work. As regards the claim of $75, he repudiated it and stated that the only extras were for a sum of $18. He claimed that he had paid far in excess of 85 per cent. of the contract price, and a great deal more than sufficient to cover these $18. Defendant's pretension was that under the terms of the contract, the present action was premature. The proof established that plaintiff had not completed his work at the date of the institution of his action. He had informed defendant that he would do nothing more, and pretended to have done more than he was obliged to do; that certain changes made by him and deviations from the plans and specifications were really beneficial to the defendant and improvements upon the plans and specifications. As the case stood, it was clear that following the contract, as the court must, the action of the plaintiff was premature. He should have fulfilled the contract and adhered to the specifications; he should have completed the works, and he should have waited for 30 days after such completion before instituting his action. The claim for $18 for extra work, which was the only sum proved, had been more than extinguished by the excess over 85 per cent. paid by the defendant upon the contract. It was clear that plaintiff had a claim for a balance upon the contract price, but he instituted his action too soon. Defendant in his protest notified plaintiff that in default of his executing the works as called for, he would execute the same at his cost. Since plaintiff declined to do the work, he should have given defendent time to do what remained to be done, so that he might be in a position to make plaintiff a tender of what was actually due. The action was premature, and for that reason it was dismissed with costs sauf recours.

THE NEW CITY CHARTER.

Several clauses affecting the building trades are embodied in the new City Charter, which was recently approved by the City Council, and now only requires the sanction of the Provincial Legislature. Among these are the following: "52 (a)—To regulate the architecture, dimensions and symmetry of buildings in certain streets; to compel the proprietors to submit the plans thereof and to previously obtain a certificate, in writing, from the Building Inspector, and to prevent the construction and order the demolition of any building erected contrary to the By-laws."

"In cases of expropriations the indemnity paid to tenants of any land or building shall not exceed the remainder of the current year, and of four years' rent of their premises; no paving of any street, lane or highways shall be laid, unless asked for by two-thirds of the proprietors, in number and value, whose property fronts thereon, and the cost of such paving shall be paid for one-half by the city, and the other half by the proprietors."

OBITUARY.

Mr. David Perrault, one of the oldest and most prominent contractors in the city, died recently at the advanced age of 83 years. He was connected with the erection of the Montreal College and St. James Cathedral.

Mr. Frederick Hortan, one of the most progressive plumbers of this city, passed out of life recently at the comparatively early age of 42 years. He was one of the most active promoters of the first plumbing association in 1887, and occupied the position of 1st Vice-President. He also advocated and was instrumental in having formed classes for the education of the apprentices to the plumbing trade held in the Council of Arts building, 96 St. Gabriel street. He was appointed instructor of these classes by the Government of Quebec, jointly with the Master Plumbers' Association, and held the position for three years, when the demands of his business compelled him to resign. Mr. Hortan carried out plumbing contracts in connection with many of the large churches, warehouses and handsome residences of the city. His death was due to an attack of typhoid fever.

THE LATE FREDERICK HORTAN.

NOTES.

Nearly five hundred car loads of scrap iron comprising the tubes of the old Victoria Bridge, were recently forwarded to the purchasers, the Ontario Foundry Co. of Hamilton.

A committee has been appointed by the Province of Quebec Association of Architects to guard the interests of the Association in connection with the amendments to the city charter which will shortly come before the Legislature at Quebec for approval.

In a recent address to the students of the Crystal Palace School of Practical Engineering in London, Sir Charles Rivers-Wilson, President of the Grand Trunk Railway Co., referred in complimentary terms to the status attained by Canadian engineers, as evidenced by the reconstruction of the Victoria Bridge, and the high standard of electric traction.

PERSONAL.

Mr. David R. Brown continues the business of the late firm of Brown, McVicar & Heriot, architects, with offices in the Canada Life Building.

Messrs. D. H. McVicar and J. C. A. Heriot, architects, have formed a partnership under the name of McVicar & Heriot. Their offices are in the Canada Life Building.

Mr. Walter H. Cottingham, who for several years past has been egaged in the manufacture of paints in conjunction with the Sherwin Williams Co. of Cleveland, Ohio, has recently been appointed general manager of the Company. This will necessitate his early removal to Cleveland. It is understood that the Montreal works will in future be under the direction of Mr. Chas. Ballantyne.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

I DO not know whether t is a sign of good times or of bad when there are so many contractors and respresentatives of trades connected with building seeking election to municipal honors. However that may be, out of forty aldermen returned at the recent elections, there are no less than twelve men who are contractors in building trades, now occupying aldermanic seats at the Council. It certainly ought to be a good thing for the city; for a builder, if he is anything, ought to be a first rate man of business; he ought to be thoroughly cognizant of the city's needs, and as an employer of labor he should have a good understanding of the condition of the working classes. Such men as Mr. William Hancock, Vice-President of the Hamilton Builders' Exchange, and Mr. W. J. Reid, Treasurer of the same institution, are "live" men evidently, and should be able to do much for the city.

Besides these two, there are now on the Council, Mr. W. M. Findlay, who has been an alderman before; Messrs. G. H. Milne, J. Phillips, H. G. Wright, W. Barrett, G. Hummell, J. H. Larkin, J. T. Ross, T. J. Stewart and P. Thompson.

It is evident from such a showing that the builders of Hamilton are a wide-awake set of men, and therefore we need not be surprised to find that the Hamilton Builders' Exchange, which was inaugurated only a few weeks ago, now numbers over seventy members. The association has secured rooms, and by the time the C. A. & B. is issued this month will have them furnished and in use.

A case of considerable importance came before Judge Snider at the recent assizes here. The suit arose as one result of the fire which destroyed the old Spectator building last May, that had since been purchased by the defendant, Procter. The plaintiff, Mills, was the contractor, carrying out extensive alterations to the interior. The contractor was paid by monthly progress certificates of the architects, Messrs. Stewart & Stewart. Up to the time of the fire the plaintiff had been paid $1,300. From the receipt of the last certificate up to the fire, work had been done by the plaintiff and materials supplied to the value of $1,000 more, but they were not entitled to a certificate according to the contract at the time. Plaintiff sued to recover this amount. Clause 8 of the printed contract relieved the owner from liability in the event of fire or other such cause during the progress of the work. The fact that the 9th clause, as to insurance by the owner, was struck out, made it clear that the parties to the contract intended that the contractor, as one of the parties, should insure the works in his own safety, but this he had neglected to do. The judge found that the owner had not received anything for insurance in consequence of the fire. Held, that the premises having been destroyed by fire without fault on either side, the contract was determined and there was no cause for action. The suit was therefore dismissed. Many cases have been recorded of fire determining a contract, and the judgment in the case in hand corresponds with the precedents. Notice of appeal, however, has been given.

Despite the severity of the winter, some people continue building operations and wilfully risk the inevitable serious results of laying brickwork during continued hard frost, but no buildings of any importance are being proceeded with, except, of course, those which completed their stone and brickwork before the winter set in.

R. W. GAMBIER-BOUSFIELD.

The calendar for 1899 issued by the B. Greening Wire Co., of Hamilton, Ont., is one of the most attractive and useful that we have yet seen. The figures are especially large and bold.

A CAUTION TO ARCHITECTS AND BUILDERS.

To the Editor of the CANADIAN ARCHITECT AND BUILDER:

SIR,—A strange, because unusual, and unusual because nothing of the kind has been done, as yet, to bring about such an occurrence (which, had it been, would have happened somewhere, ere this) has just taken place here at the old Vendome restaurant premises, north side of St. Joseph street.

I hear, since the accident, that the same thing once happened in Montreal, though, in that case as in this, supposed to be due rather to some settlement or pressure on the glass from the superincumbent weight of overlying stories, or to some vibratory action of the air, than to the true cause of the phenomenon.

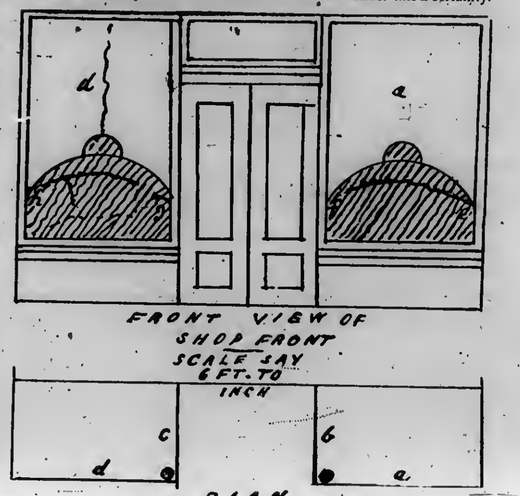
The accompanying sketch is almost self explanatory, and shows at a glance what has happened. The shaded portions of the plates A and D had just been painted a dark green, and in fact the painter was still at D, when plate A cracked across from E to F, and so did plate D, from G to H, soon after it was finished.

Of the side lights B and C, B only has been fissured, and in the same manner; plate C has not suffered, from not being exposed as the others were to the action of the sun.

Every one knows how the vein or thinner portion of a tumbler or drinking glass, on the contact of hot water breaks away from the thicker bottom, which takes longer to expand. The same thing, or rather an action analogous to this, has happened in the present case.

Unpainted, unobstructed glass, as is well known, allows free passage to the sun's rays, while the glass itself remains cold or unaffected; but with the painted portion (the paint applied from the inside), provided this paint be of a dark shade and impermeable to the sun's rays, so to say, the rays are intercepted, and their heat becoming stored up in such portions of the plate, cause it to expand and tear itself away from the cold and unexpanded portion of the window.

The nature or position of the cracks or fissures render this a certainty.



Sketch to scale of about 6 feet to inch, showing plate glass shop windows—old Hotel Vendome, St. Joseph street, Quebec—north side. Painted dark green where shaded and broken along lines E F and G H by expansion of painted portion by sun's rays.

For instance, the fissure in plate D starts from and terminates with the very points E and F where the shading or painting ends, and very nearly the same thing has happened to plate D, where one of the extremities of the fissure is about three or four inches below G, while the other end of it is about two inches above H; and the same result obtains or thereabout in the case of the side light B. A remarkable fact, also, is that each of the three fissures, instead of running nearly straight or horizontally across the plate, follows a curved line nearly concentric to the curved line of painting.

This does not, or at any rate is is no way so likely to occur, when the shading or obscuring of the glass is done with white paint, or some process by which no dark tints are used; and I can here take occasion to say that Flammarion, in his last bulletin of the Astronomical Society of France, Paris, relates how—all other conditions being the same—having experimented for a season on the effect of colored glass on vegetation, he found that of half a dozen seeds of a kind, planted opposite as many different colors or shades of glass; that opposite the clear or white glass attained during the trial to a height of some 6 feet, while all the others produced plants of a lesser and lesser stature, the height in the case of the green and blue glass dwindling down to not over one foot during the experimental season.

Every one knows, also, the attraction dark colors have for the sun's rays, and how substances thus colored become heated and transmit the heat they receive, as can be seen when, during a thaw in the spring, while a piece of white cloth or flannel, for instance, hardly makes an impression on the snow it lies on, the black material, on the contrary, sinks deep beneath the surface.

The damage in the present case, or cost of replacing the full-sized plates of glass, may be some $200 or more, and the question arises who is to pay the piper?

CHAS. BAILLARGE, Architect, etc.

QUEBEC, Dec. 24, 1898.

MANUFACTURES AND MATERIALS

THE LATE MR. F. S. RATHBUN.

WIDESPREAD regret followed the announcement of the sudden death from heart failure on November 26th last, of Mr. F. S. Rathbun, Secretary-Treasurer of the Rathbun Co., of Deseronto, Ont. The late Mr. Rathbun was born in Deseronto in 1856, his father being the late Hugo Burghardt Rathbun, founder of the Rathbun Company. At the age of sixteen he quitted the school which he had been attending in New York, and entered the office of Messrs. H. B. Rathbun & Son. At the formation of the present company he was

THE LATE MR. F. S. RATHBUN.

appointed secretary-treasurer, a position of great responsibility, which he filled with marked ability. He was also an officer of a number of other enterprises in which the Rathbun Company were financially interested, and in addition was for many years treasurer and postmaster of Deseronto.

A strike of stonecutters is in progress in connection with the quarries at Crookston, Ont. The owners express their intention to cease operations at the quarries during the winter.

The Londonderry Iron Co. of Nova Scotia have gone into voluntary liquidation. At a recent meeting of creditors held in Montreal, Mr. Geo. Creak, accountant, of that city, was appointed liquidator.

A quarter of a million dollars is said to have been subscribed towards the establishment of the paving brick Company, of which Mr. J. W. McBride, of Toronto Junction is the promoter, reference to which was made in our December number.

The Dominion Radiator Co. of Toronto, have recently purchased additional land 150x130 feet, south of their present premises, and are negotiating for land on Melbourne Avenue with a view to further enlargement of their present extensive works.

A new abrading material equal to emery in hardness, according to the claims of Mr. Floryanowicz, the Russian inventor, as described in the Engineer, is made from fireclay. The clay is thoroughly washed, mixed in a pasty mass, dried, and then burned at a temperature of about 2,300 deg. Fah. The result is a uniformly hard product with a hardness of 8 to 9 on the Mohr scale; this is equal to that of emery. The burned clay is crushed and used for making wheels, etc.

IN mercantile architecture, the demand for show window space has forced upon architects many a sacrifice in the way of design. This feature of large show windows must be frankly accepted as an essential condition in retail store buildings, and in every detail they should be made as effective and attractive as possible. The proper lighting of these windows at night does not always receive the attention it should from architects. If it were a question of lighting a picture, no architect would hesitate as to the right way. Why should not a show window be arranged to light the merchant's goods, as a picture is lighted? The best specification for this purpose is the store window light devised by Mr. I. P. Frink, after forty years experience in making special lighting fixtures. It is a modification of Mr. Frink's famous "picture light" used in he Metropolitan Museum of Art, New York, the New Corcoran Gallery, Washington D. C., the Art Institute, Chicago, Ill., the Carnegie Library, Pittsburgh, Pa., and many other public and private art galleries. Full particulars of this store window light, as well as a estimate on any particular work, can be promptly secured by writing to Mr. Frink, at 551 Pearl St., New York.

STUDENTS' DEPARTMENT.

C. A. & B. STUDENTS' COMPETITION.

BELOW will be found the reports of the Committees of Award of the O. A. A. and P. Q. A. A. on the above competition:

To the Editor of the CANADIAN ARCHITECT AND BUILDER.

SIR,—We have placed designs by "Caza" first, in connection with which we make the following remarks:

Design of domestic chimney (left hand upper corner): The general idea of this one is good, but the buttress set-offs on same are much too low down, not only detracting from the appearance, but interfering with the saddle, which would have to be placed behind. The details of the top are not as good as the outline.

The other domestic chimney is a good simply-designed feature, and is agreeably worked in with gable, and has evidently a nice corner beside the fireplace.

The scholastic chimney is an exceptionally nice quiet bit of designing, the proportions being unusually good, and the drawing in connection with this is well done.

The classical chimney is weak in design and poorly drawn.

In "Caza's" details he has failed in more than one instance to design proper drips to his mouldings, which in execution always is attended with bad results.

"Percival's" designs are also good, but the design in left hand corner is somewhat "fussed." The outline of upper part is not a pleasing one, with the chamfer below and the angle columns above buttress set-offs. The drawing could be improved upon.

Lower left hand design is an agreeable bit of composition, nicely proportioned. The cut stone base to the angular portion is "faked" in the perspective, as if constructed as shown in detail, the splay is too flat to be properly seen in execution.

His "Queen Anne" chimney represents a rather well designed gable, though the top is hardly in keeping with the ramped work.

The classic chimney is an unpretentious but well designed feature.

"Colonial" submits a sheet of designs in which he shows his good sense in trying to design in a good style. With one exception his designing is unconstructional, having stone angles without bond swags across brickwork, etc. He is practically ruled out of the competition by not conforming to its requirements, but it is to be hoped he will try again.

It is to be regretted that a competition on such an interesting subject met with such a poor response.

JOHN GEMMELL
W. A. LANGTON
A. F. WICKSON
} O.A.A. Committee.

To the Editor of the CANADIAN ARCHITECT AND BUILDER.

SIR,—Re C. A. & B. Students' Competition for four ornamental chimneys, compositions as a whole were found weak, design by "Caza" showing better qualities of drawing—"Percival" being nearly equal to the first mentioned. As to "Colonial," he is inferior in drawing and composition.

For the standing Committee on Competitions, P.Q.A.A.,

JOS. VENNE, Secretary.

[The names of the successful competitors in this competition are: 1. "Caza" (Mr. A. H. Chapman), 28 Toronto street, Toronto; 2. "Percival" (Mr. Elmer H. Russell), 145 Yorkville avenue, Toronto.—THE EDITOR C. A. & B.]

ONTARIO ASSOCIATION OF ARCHITECTS.

Proceedings of Eleventh Annual Covention.

THE eleventh annual convention of the Ontario Association of Architects was held at the School of Practical Science, Queen's Park, Toronto, on Tuesday and Wednesday, the 17th and 18th inst. At 2:30 p.m. on Tuesday, the 17th, the first session of the convention was called to order in the lecture room of the School of Practical Science, the President, Mr. S. H. Townsend, in the chair. There were present Messrs. Baker, Burke, R. J. Edwards, W. R. Gregg, Gemmell, Hall, Helliwell, Belcher, Dick, Bird, Gordon, Aylesworth, C. E. Langley, Langton, A. E. Paull, Pearson, Siddall, Townsend, Wagner, Wickson and Wilmott, members of the Association, and Messrs. Wells, C. H. Acton Bond, J. C. B. Horwood and Sandford Smith, unattached.

The minutes of last meeting having been read and confirmed, the following report was presented and read by Mr. Edmund Burke, the Treasurer:

TREASURER'S REPORT.

1898.	Dr.	
Jan. 1.	To balance from 1897	$1,021 78
	Members' annual fees	319 00
	Students' registration fees	18 00
	Students' examination fees	2 00
	Sale of examination papers	50
	Interest on Treasurer's bank account	35 90
		$1,397 18

1898.	Cr.	
Dec. 31.	By W. A. Langton, salary for the year	$199 98
	W. A. Langton, general disbursements	18 16
	Printing reports, circulars, etc.	23 97
	C. H. Mortimer, CANADIAN ARCHITECT AND BUILDER for 1898	22 00
	Harry Webb, Convention lunch	20 25
	R. M. Williams, engrossing Minutes	10 00
	Davis & Henderson, receipt book	2 25
	W. J. Graham, attendance at Convention	5 00
	Wm. Tyrrell & Co., letter heads	5 00
	Nelson R. Butcher, typewriting	4 11
	Books added to Library	4 00
	Total disbursements	$ 314 72
	Balance on hand	1,082 46
		$1,397 18

We have examined the books, vouchers, etc., of the Association, and certify that the above is a correct statement thereof.

HENRY LANGLEY, WM. R. GREGG } Auditors.

The Treasurer, in submitting the accompanying statement, has to report that all outstanding accounts for the year, as far as presented, have been paid. The expenditure ($314.72) is $128.28 less than last year. This saving has been made up, principally, by the reduction in the salary of the Registrar of $100. The receipts, amounting to $375.40, including bank interest, are $187.05 greater than last year. The increase in the receipts is due to the payment of arrearages by a large number of members who were in danger of having their names left off the register. The fees received for 1898 amount to $86. The balance in the bank is $1,082.46, being an increase over last year of $60.68. The following is a comparative statement of the income and expenditure for the past three years:—

	1896.	1897.	1898.
Members' annual fees	$ 271 00	$ 112 00	$ 319 00
Members' registration fees	15 00	15 00	.....
Students' registration fees	12 00	17 00	18 00
Students' examination fees	9 00	5 00	2 00
Sale of examination papers	.50	25	50
Library fines	.....	20	.....
Interest on Treasurer's bank acct.	46 20	38 90	35 90
Expenditure	573 32	443 00	314 72
Balance on hand	1,276 43	1,021 78	1,082 46

Respectfully submitted,
EDMUND BURKE, Treasurer.

In presenting the report, the Treasurer drew attention to the increased amount received from members' fees, and pointed out that this was owing the fact that a number of members who were in arrears for some time back had paid up, and therefore the deficit was less than it would otherwise have been. This payment of back fees was something, however, which might not occur again, and he thought the Association was fast approaching the time when they must revert to the order of things which existed before incorporation, when all services were honorary. Unless something could be done to enlarge the membership roll or increase the fees, to continue in the present course would be suicidal, as there was year by year a decrease in the amount of the balance in hand, and in a few years at most they would find themselves without funds. He could therefore see no other course than to revert to the plan of having no paid officers, if the balance they ought to maintain was to be preserved.

The President agreed that it would be necessary to take some such action as that suggested by Mr. Burke. Although this year the receipts were slightly in excess of the expenditure, owing to the causes explained by the Treasurer, it would be impracticable to continue much longer on the present lines.

The Registrar, Mr. Langton, pointed out that if all the members in arrears paid up there would still be a considerable lump sum to come in; but the regular annual income from the membership fees and other sources would on the present reckoning amount to about $328, which was too close to the expenditure.

On motion by Mr. Siddall the report was then received and adopted.

The report of the Registrar and Librarian was then read by Mr. Langton, as follows:

REPORT OF REGISTRAR AND LIBRARIAN.

MEMBERS.—Pursuant to the recommendation of the last Convention the Council omitted from the list of members printed in 1898 the names of those who were in arrears for the annual fee for a longer period back than 1896. Members so in arrears were notified by registered letter that their names would be omitted from the list if their arrears were not paid up to this point. The membership as thus printed numbered 37 non-resident members, 29 resident members and 6 travelling members; in all 72 members. Since the list was printed one non-resident member has died.

STUDENTS.—There have been three students registered. The examinations were held in March. The board of Examiners was, Prof. Galbraith (Chairman), Messrs. C. H. C. Wright, S. G. Curry, R. J. Edwards, W. R. Gregg, Grant Helliwell, W. L. Symons, S. H. Townsend, A. F. Wickson, and the Registrar. There were two students examined: one for the First Examination, who was allowed a supplemental examination, but has not yet come up for it; and one for the Final Examination, who was plucked.

PROCEEDINGS OF THE COUNCIL.—The resolution of the Convention requesting the Ontario Government to place a sum of not less than $5000 at the disposal of the School of Practical Science, for the purpose of making such tests of Canadian building materials as will furnish reliable data for use in the building trades, was duly forwarded to the Government through the Hon. Minister of Education. The Minister, in reply, said that the recommendation is worthy of careful consideration, but that, as the House had risen, no money could be voted until the next session. There was a formal session of Parliament in the summer, but no general business was transacted. The Council have amended the by-law relating to Student's Fees, Article 3, to read:—"The fee for examination shall be $10.00 for each examination and $2.00 for each supplemental examination." This by-law to affect students registered after January 14th, 1897. Two competitions which took place during the year, one at Stratford and one at St. Thomas, were brought to my notice by members of the Association as having unsatisfactory conditions; and, as instructed by the President, I wrote to the promoters of the competitions to endeavour to procure amendment of the unsatisfactory clauses of the conditions in accordance with the Association model of conditions of competitions which I enclosed. In each case I was told that the competition was too far advanced for a change in the conditions to be possible.

THE LIBRARY.—There have been 42 lendings among 19 borrowers. Additions to the library have been: Building Construction and Superintendence, Part II., by F. S. Kidder; Specifications, by W. F. Bower; Lectures and Lessons on Art, by F. W. Moody.

On motion by Mr. Wickson, seconded by Mr. Baker, the report was received and adopted.

The President's address was then read as follows:

PRESIDENT'S ADDRESS.

GENTLEMEN OF THE ONTARIO ASSOCIATION OF ARCHITECTS: In welcoming you to this our eleventh annual convention, I am glad to be able to congratulate you upon the present prospects of increasing prosperity in most branches, at least, of our work. But I regret to say, I am forced to admit that, in connection with the Association itself, the outlook is not so bright.

Three years ago a former president (Mr. Darling, I think) stated that the Association practically numbered among its members every person following the profession of architecture within the province. Since then there has been a considerable falling off in our membership, and not a few young men have opened offices, and begun practice, without having passed the examinations necessary to entitle them to become members of the Association; I doubt if the present register contains the names of more than two-thirds of those now practising in Ontario.

There are, however, some grains of encouragement: In Quebec, the Legislature, at its last session, passed an amendment to the "Architects' Act," restricting the use of the title "architect" to qualified persons; in England the registration movement has been steadily gaining ground, the President of "The Society of Architects" in his last address expressing the conviction that the bill would become law; and in the state of Missouri a measure—similar in effect to the one already passed in Illinois—is now before Congress.

And here it may be noted that the English bill is a much more comprehensive measure than our own. It not only seeks to restrict the use of the title to persons qualified to perform the duties of an architect, but also endeavors to prevent unqualified persons from attempting to perform those duties; and the American acts are still more restrictive—while our governments have never been asked to do more than restrict the use of the title to those who are qualified. On the whole, therefore, I think we need not despair of ultimately obtaining the amendment asked for.

The year has been a very quiet one and there is little of importance I can bring before you which is either new or interesting.

The early part of the year was marked by an unprecedented number of building failures, resulting in considerable loss of life and destruction of property. As usually happens at such times, after a score or more of lives have been sacrificed, public attention was directed to the unsafe condition of many of our public buildings, and efforts were made in some quarters to ascertain the extent of the hazard—for the most part without any practical results, because, as a rule, those having the care of the buildings in charge neglected to put the work into competent hands.

As mere instances of the danger to the public existing under the present system, I may refer to three incidents which came under my notice at the time:

1. At the inquest following the London city hall disaster a coroner's jury actually went out of its way to state that more than ordinary care was used in the construction of the beam that failed, in face of the fact that the safe load upon the floor carried by this beam was only something like ten pounds per square foot.

2. Under the influence of the public alarm caused by the London and Oshawa failures, the council of one of our oldest cities commissioned its leading architect to examine and report upon the condition of the buildings owned by the corporation, and, at a subsequent meeting, an alderman who was not present when the appointment was made, is reported to have spoken very violently in opposition to his employment, charging the council with reckless and unnecessary expense, one of his reported sentences being, "Me and Jimmy Jones as knowin' the strength of timbers could ha' done it without costin' nothin'," ("Jimmy Jones" standing, if I am rightly informed, for the corporation superintendent of buildings).

3. In another town a local practitioner was commissioned to build a public hall—the upper storey of a building twenty-four feet wide—and proposed using for the floor, which was to have no intermediate supports, 2 in. x 12 in. joists at 16 in. centres. The London disaster occurring about this time, he evidently became frightened, for he sent his drawings to me (probably having seen my name as president of the Association), explaining that he was afraid the floor would not be stiff enough, and asking if I thought there was a cheaper way of making it strong than by nailing 1¼ in. x 3 in. hardwood strips (Queen post fashion) on the sides of the joists.

Curiously enough the journals containing accounts of these building failures published, side by side with them, a series of attacks upon the Association, the writer asserting the principle of registration to be wrong, and, with all the confidence in the world, advocating municipal supervision in its place, just as though the failures there reported did not afford the most complete refutation of his theories.

Municipal supervision is a very good thing (if properly carried out) as an additional safeguard, and what hope could any sensible person have of getting it properly carried out, under existing conditions, anywhere in Canada? But, to substitute it for scientific knowledge in the architect, as a means of avoiding building accidents, would be about as sensible as providing for the storage of naptha, a combustible building heated by an open fire and safeguarded by an elaborate fire protective system, as a substitute for an incombustible one heated by steam pipes. There is danger in both; danger is inherent to the condition—but, how different.

As these letters have been very fully answered by the Registrar, I need not take up your time by further reference to them. But I would like to say a few words in answer to another kind of attack continually being made upon the Association. I mean the complaints of those writers who censure the Council every time they hear of members of the Association entering a badly conducted competition, or accepting lower fees than in their opinion should be charged for work; and the objections of others who are continually crying to the Council to do something—they never say what—to make the Association of more interest to its members.

To the first class of objectors I wish to point out that the Association is not a "trades' union," and does not believe in trades union tactics.

It is true that the Council has, as a matter of education to the public (and to the profession as well), prepared a set of competition regulations, and forwarded copies upon occasion to building committees, as suggesting the standard of fair conditions necessary to induce the best class of architects to compete: and it has analyzed and pointed out objectionable features in other conditions, and advised members against entering competitions where the conditions were unfair, and some members of the Association who have disregarded the advice have been sorry for it afterwards.

But the Council has never sought to coerce its members to any line of action, either in regard to competitions, fees, or other matters in the conduct of their business. It is not its province to do so.

These matters are personal to each practitioner and do not concern others, or the profession generally; and the Association has no right to interfere, save when the matter is of such a nature as to involve dishonest dealing upon the part of the practitioner.

It is, as Mr. Darling so lucidly pointed out in his presidential address, the indisputable right of an architect to fix the scale of fees for his own practice at what he considers his services are worth, and—however foolish it may be for him to differ from the recognized tariff—nobody has any right to complain, provided he charges everyone the same.

But it is clearly not honest for the individual who is ready to sell his services to a close-fisted client for 2 or 3 per cent., to charge 5 per cent. or more for the same services to the easy-going one who neglects to make a bargain with him beforehand, and I think this Association should take some steps to prevent the man who wishes to act in this dishonest way from making use of the tariff of the profession to collect, from clients who do not bargain beforehand, larger fees than he makes a practice of accepting from those who do. Possibly some good might be accomplished by an official notification to the courts, that the schedule of charges generally accepted by the profession as fair remuneration for professional work is not intended to over-ride any standard an individual practitioner may, by his own practice, have set up for himself.

To the second class of objectors—those who complain that the Council is not active enough, and that the Association fails to give a direct return for the fees paid—I would like to explain that the Association has never promised a direct and immediate return, in benefits, to its members. It was not formed for that purpose.

The sole purpose for which it was established is, to so educate the public and the profession, as to raise the status of Canadian architecture and establish a standard whereby the public can distinguish between competent and incompetent practitioners.

And yet it seems to me that for the few short years our Association has been in existence, it has not altogether failed, even, to be of immediate and direct benefit to its members.

With the aid of the Faculty of the School of Science (I might also say by aiding the school, for, although the initiative is due to the Association, the school has done no small part of the work), the Association has already placed within the reach of its members and architects generally, a large amount of exact technical data, gathered from experiments upon the building materials we are using every day; and has laid the foundation for a more extensive system of tests, which, if the government will but grant us the assistance we ask, will soon place the architect employing Canadian material beyond the necessity of using for his structural calculations, data derived from experiments made upon foreign materials of which he knows little, under conditions of which he knows less.

It has formulated and placed at the disposal of the cities and towns of the province a set of building by-laws and regulations which, if adopted and enforced, would result in great benefit to public and architect alike.

It has held conventions and exhibitions, and given public lectures on subjects calculated to raise the standard of architectural knowledge and educate the public to a just estimate of the value of high architectural skill.

It has dealt with fraudulent and unfair competitions, and has prepared a summary of the conditions essential to fair competitions, which, if adopted by building committees and insisted upon by architects, will result in benefit to both.

It has got together a library for the use of its members and their students, which (although but a small one) has been selected with unusual care, having special reference to the needs of students and those practising in small places where books of reference are difficult to obtain.

And last, but not least, it has fostered an "esprit de corps" and feeling of fellowship among its members, which is gradually bringing all the better men in the profession into sympathy with each other's higher hopes and aims, and enabling them to work together with one common object—the advancement of the art they love—or ought to love.

No one conversant with the condition of affairs prior to the formation of the Association can fail to see a marked advance in this respect—an advance which to many would, alone, be a sufficient warrant for its existence.

This record would not, I venture to say, have been a very discreditable showing had the Association been established for the express purpose of benefitting its members and nothing else, but, as I have said before, the real object of the Association is purely an educational one — to so educate the public and the profession as to raise the status of Canadian architecture and establish a standard whereby the public may be enabled to distinguish between qualified and unqualified practitioners.

In pursuit of this aim also the Association has at least performed its duty. In addition to the various achievements (if I may be pardoned the expression) already referred to, most of which are distinctly educational in effect, it has defined the course of study best adapted to the education of persons intending to qualify themselves for the practice of architecture, carried on the examinations required by the "Architects' Act," held lectures for students, and even furnished students with books free of charge. In fact, it has done almost everything a purely voluntary association can do to produce a high standard in the profession, but it can never be fully successful in this while the Act remains in its present shape.

Voluntary examination may be all very well in its way; it will

stimulate and encourage the best class of students, and architecture will be benefitted by it to the extent of such encouragement; but so long as any one may call himself an architect without first proving that he has the qualifications necessary to safe and proper practice, lazy and stupid students will continue to shirk the examinations and the study necessary to pass them, and will foist themselves upon the public as architects, assuming the title and undertaking professional work with all the assurance of experience and competency. Failures must of course ensue, and the public, knowing the culprits only as "architects," and having no way to distinguish between the competent and incompetent persons using the title, will naturally enough charge the crime to the whole profession, and so fail to give, even to the competent architect, that entire confidence so essential to the successful conduct of professional work.

And yet, because we ask the government to give the public the means of making this distinction, we are accused of duplicity in stating our aim to be "the raising of the standard of architectural practice," and are told that our real object is "the regulation and restriction of the profession." Yet could any mistake be more stupid? Restrict the use of the title to competent practitioners only, and the necessity for regulation disappears.

But now in the meantime can we not, as a voluntary paper-reading association—an R.I.B.A.—do something to further our aim and art itself?

One or two matters occur to me which might be dealt with.

The Municipal Council of Paris offered prizes to the architects and owners of the most attractive houses erected in that city during the past year, and the result is said to have been highly encouraging. Would it not be well within the scope of this Association to urge the authorities of Canadian cities to take similar action? Might we not ourselves offer prizes to cover the work of the whole province? The prizes need not be large, for the honor of pre-eminence ought alone to be a sufficient inducement. Such a movement, if properly carried out, might give no small impetus to architectural studies, and awaken a public interest which could hardly fail to have beneficial effects upon the development of architecture in this country.

Can we not also renew our efforts to secure the continuance, upon a large scale, of tests of Canadian building materials and inventions? The Society of Architects is winning laurels for itself in this direction.

Mr. G. Helliwell then read the report of the Toronto Chapter, as follows:

REPORT OF THE TORONTO CHAPTER OF THE ONTARIO ASSOCIATION OF ARCHITECTS.

The Executive Committee of the Toronto Chapter beg to report to the Ontario Association of Architects in convention assembled:

GENTLEMEN,—The Chapter has met regularly at the School of Practical Science on the second Monday of each month, exclusive of the summer interim.

In all seven meetings have been held. The average attendance, as taken from the minutes, has been about nineteen. The largest attendance was at the November meeting, when the Rev. C. H. Shortt, M.A., delivered a very instructive and interesting lecture on Gothic architecture in the time of King Henry.

The number of members on the roll now is twenty-seven. At each meeting of the Chapter a programme of interest has been provided, usually in the form of the reading of papers. The following is a list of the subjects treated: "Some Points in Wood Construction," by Mr. H. B. Gordon; "Decoration," by Mr. S. G. Beckett; "Specifications and Tests for Structural Steel," by Mr. J. A. Duff; "Suggestions on House Planning," by Mr. Grant Helliwell; "Steam Heating," by Mr. William Mansell; "Interior Decoration," by Mr. W. H. Elliott; "Gothic Architecture in the Time of King Henry," by Rev. C. H. Shortt, M.A.; "Domestic Architecture in the Eastern States," written by Mr. A. N. Patterson, M.A., A.R.I.B.A.; and read by Mr. Baker; "A Few Notes on Tall Building Construction," by Mr. J. Wilson Gray.

The Chapter at the November meeting appointed as its representatives on the Technical School Board Messrs. W. A. Langton and A. F. Wickson.

At the annual meeting of the Chapter held in April last the following were elected to act on the Executive Committee, viz., Messrs. Burke, Gregg, Helliwell and Jarvis, who, together with Messrs. Baker and Wickson, form the complete executive.

The committee met subsequently, and appointed its officers as follows: Grant Helliwell, chairman; F. S. Baker, vice-chairman and also secretary-treasurer.

The above is respectfully submitted.

(Signed) GRANT HELLIWELL, Chairman.

Toronto, Jan. 17th, 1899.

Mr. Burke pointed out that while the average attendance at the meetings of the Toronto Chapter was 19, that hardly gave a fair idea of what the attendance was in reality. At the meeting at which Rev. Mr. Shortt lectured, there was an attendance of 60, which had materially brought up the average. As a matter of fact, he thought that seven or eight was more like the average attendance at the ordinary meetings.

Mr. Baker said that was too low, he would place it at twelve.

Mr. Burke thought even that was a poor showing. The Toronto Chapter was intended to take the place of another organization, which had given way to it, and with such a small attendance he did not think it was quite fulfilling its purpose.

Mr. Paull complained of the dilatoriness which prevailed in the matter of beginning meetings sharp on time, which he thought was unbusiness-like, and probably had the effect of deterring some from attending.

Mr. Gregg said that probably if they availed themselves of one resource which had not hitherto been tried, it would result in a better attendance at the Chapter meetings. That was for the members to remain at their offices until 6 or half past 6, and then meet at some place arranged, have tea or dinner together, and afterwards to hold the meeting while all together. Until that had been tried he did not think it was right to say the Chapter had not fulfilled its purpose of taking the place of the Guild, the organization referred to by Mr. Burke.

Mr. Helliwell, referring to the remarks of Mr. Paull, said that the delay in calling the meetings to order was occasioned by the desire to give members an opportunity to look over the very interesting drawings and books which were laid out on the tables on the occasion of the meetings. For his part he had always found that time well spent, and he did not think it had the effect of keeping members away from the meetings.

Mr. Paull quite agreed that the time spent in the way referred to by Mr. Helliwell was profitably employed, but thought it would be better to have it definitely stated on the agenda that such time would be given for that purpose, making the hour for opening the meeting that much later, but beginning sharp at the time stated.

Mr. Baker wanted to know what was going to be done with the ghost of this Toronto Guild, which, it seemed, would not down. It was news to him that the Toronto Chapter had been formed out of the old Guild. The Guild, he had always understood, was a society not connected with the Association. The Chapter, on the other had, was the Association. He thought it would be a good thing to drop the word Chapter, and simply hold meetings of the Association once a month, and members ought to make a point of attending these meetings. He did not desire to further take up the time of the meeting, although he would willingly spend an hour in defence of the Chapter meetings, because he had great faith in their possibilities for usefulness.

Mr. Langton said he had always an inward feeling of resentment against the idea that he or any other member should attend these meetings as a matter of duty. If the Chapter could make its meetings sufficiently interesting and profitable to induce members to leave their firesides and their books well and good, but he deprecated the idea that he or any other member should be called on to attend meetings when they felt that that was not making the most profitable use of their time.

Mr. Baker maintained that some of the papers read were of a high order, and quite interesting and instructive enough to warrant one's leaving his fireside.

On motion by Mr. Helliwell, seconded by Mr. Baker, the report of the Toronto Chapter was then received and adopted.

Mr. Siddall inquired if the present was the proper time for him to move his amendment to the by-laws of the Association.

The Registrar said the clause in the report of the special committee appointed to deal with questions connected with the Association read as follows: "Your committee would recommend that the word "ten" in clause 2 of the the by-laws passed by the Association at the annual meeting be struck out, and the word "five" be substituted, and that this recommendation stand as notice of motion to be discussed at the next convention."

The clause referred to was, "Any person being a British subject, who has for ten years been practising the profession of architecture and residing within the province, and is, at the time of his nomination, a member in good standing of this Association, shall be eligible for election as a member of the Council." It was proposed to read five years instead of ten years.

Mr. Siddall said it was no doubt within the recollection of all present that this motion had been fairly discussed, not only in the convention last year, but in a committee appointed to consider the matter, which committee reported in the manner which had just been read. It might, however, be well to state, in case any had forgotten, that the object aimed at was to infuse new blood into the Council of the Association. It had been felt that the Council, being composed of old established architects, might be benefitted by having some of the younger members included in it. He held that opinion himself, and he thought there was a sufficient number of that view to compass the bringing about of that change.

Mr. Gregg had great pleasure in seconding the motion.

Mr. Wickson said that while the committee that reported upon the matter evidently felt very strongly regarding it, still it was desirable to proceed with caution. While the action suggested might be a good thing, it seemed to him that from ten years to five years was a long jump, and if a reduction was made he was personally strongly in favor of a term of more than five years. He would therefore, unless it required a whole year's notice, move in amendment that it be made to read seven years.

Mr. Burke agreed with Mr. Wickson, that the drop from ten to five years was rather too great, but he would be very glad to support the motion if it were made seven years.

Mr. Baker said he had been looking over the constitutions of other associations, and the longest term he could find in any of them was seven years. In the New South Wales, Australia, association, and several others, the limit was five years. He thought it was immaterial whether it was made five or seven years, and he did not suppose Mr. Siddall cared for two years either. He thought a man who had spent five years in the profession, if a clever fellow, might, if elected to the Council, prove a very desirable acquisition to that body. If he was not a fitting person, there was little danger of his securing election.

Mr. Gregg did not think there was any danger to be apprehended; even if a five years member who happened to be lacking in experience and judgment did find his way into the Council, he would find himself surrounded by men older than himself, by association with whom he would gain those qualities in which he might be lacking. It was not at all probable that the proposed change would have the result of bringing in a majority of the younger men and enabling them to carry everything their own way. He saw no danger in making the term five years.

Mr. Wickson admitted the force of Mr. Baker's argument, that the election was in the hands of the Association, who might be relied on to choose suitable persons even in the absence of any qualifying limitation. At the same time he thought it was often found desirable to retain a good rule on the books.

Mr. Dick said that while he was conservative in his tendencies he felt that in this matter the limitation ought to be removed as far as possible; certainly it should be reduced from ten years to five. For his part, he would not object to the total abolition of the qualification, and the throwing of the whole responsibility of electing proper persons upon the Association; he thought the members ought to be able to choose the right men for election to the Council, whether they were architects of one year's experience or of ten years' experience. He therefore should support the shortest term mentioned.

The President thought it was advisable that a member should have sufficient time to demonstrate his fitness to represent the Association. He thought, however, that five years was quite a sufficient time for that, and would support the motion to that effect.

Mr. C. H. Acton Bond asked if a non-member might be allowed to speak on this matter, and being assured by the President that the meeting would be very glad to hear either him or any other of the visiting members, made the suggestion that a safeguard would be provided if a certain proportion of the Council was limited to ten years' men and the other portion to five years' men.

The Registrar, Mr. Langton, did not think there would be any danger in making members of even less than five years' standing eligible for positions on the Council. Of the younger members there was no likelihood that any would be put forward but those who engaged actively in the work of the Convention, and gave evidence in that way of their capacity for administration; the others would not suggest themselves as suitable persons. He felt that the interests of the Association were far more likely to suffer from inability to elect to the Council really desirable men of less than ten years' experience than from any sudden influx of the younger element.

Mr. Wickson, while recognising the suggestion of Mr. Bond as theoretically the ideal one, thought there were considerations which would render it impracticable, such as the rotation question. With the permission of the Chairman, he would withdraw his amendment, and allow the original motion to go to the meeting.

Mr. Burke, seconder of Mr. Wickson's amendment, having assented to its withdrawal, the original motion was put and carried.

The meeting then proceeded to the consideration of "New Business."

Mr. Burke, following up the remarks made by him in presenting the Treasurer's report with regard to the state of the funds of the Association, said he thought the time had now arrived when the Association or the Council ought to consider some scheme for the reduction of the expenses. He did not know whether he had any support in the meeting on his view, but he very much desired to elicit some expression of opinion regarding this subject.

Mr. Baker thought the Treasurer's report was not quite so discouraging as some seemed to imagine, but rather indicated that after the dark days of the past few years there was light ahead at last. It was true they had not succeeded in obtaining the sought for amendment, but he thought it would be well now to recognize the inevitable and direct their energies, hitherto expended largely on that object, into other ways of building up the Association. With that object in view he had prepared a few suggestions, which were as follows:

That a committee, consisting of six members in good standing to be selected by the President, be appointed to consider the following and other matters:

1. To find, and if possible obtain an option upon, a premises which would make a suitable headquarters for the Association.

2. To consider the advisability of increasing the membership fees, and of using a portion of the increased income to form a benevolent fund to be used for the relief of any worthy member who may be in distressed circumstances.

3. To approach the government with a view to their appropriating funds to provide a medal, to be known as the "Ontario Gold Medal," to be presented annually to the member of the Association or other architect, whose work in ordinary practice in Ontario is considered of the highest merit.

4. To consider the advisability of providing a suitable medal out of the funds of the Association annually, and of raising a sum of money by popular subscription or otherwise to found a scholarship or travelling studentship, and that this medal and scholarship be presented each year to the student who ranks highest in the final examination for qualification for membership, or for other qualifications.

That this committee confer with the Council from time to time and present a definite report to the Convention of 1900, and that the adoption of this motion stand as notice that these matters will be moved at the next convention.

He made these suggestions merely to afford a working basis or plan of action. It would be observed that the suggestions operated equally in favor of members residing in Toronto or elsewhere. Referring to the first item, he thought it was time they abandoned their swaddling clothes and assumed the full status of manhood as an Association. He thought the Association ought not longer to rely upon the good offices of those who had so kindly in the past permitted them to use the School of Practical Science, but should now establish a headquarters of their own; he felt that the dignity of the Association demanded it. The second item, the increasing of the membership fees and forming a benevolent fund was equally desirable. He thought the present membership fee was exceedingly low; he had

never heard of any similar institution in which the highest membership fee was only five dollars, and, though he did not desire to criticize, he was inclined to think a mistake had been made when the fees were reduced, and that that action was in some degree responsible for the falling off of the Association, because it might be argued that where the fee was so low the benefits must be small, and it could not be worth while to become a a member. The benevolent fund of the Royal Institute of British Architects had been growing and increasing, and in the few cases where its benefits had been applied had been found an exceedingly good thing. Of course it was known to all that subscribers to a benevolent fund were entitled to its benefits without being under obligation to anyone for them. The third item, the application to the government for funds to establish an "Ontario Gold Medal," he thought would furnish an incentive to architects which would have the effect of improving their work in every direction. The medal would be sought tor by the architects of the province just as the Royal gold medal of England was regarded as the highest honor to be attained by any old country architect. Of course, Canadians were eligible as competitors for that medal, but it was not likely under present conditions that it would be obtained by a Canadian. The course he suggested would be in the public interest, as it would result in a generally improved class of architecture, and it was therefore something which ought to meet the approval of the government. The fourth item in his motion was the providing of a medal out of the funds of the Association, and a scholarship by public subscription or otherwise, to be competed for by the students of the Association. He thought that hitherto the Association had not held out sufficient inducement to its students; in fact, he almost felt like saying they had been neglected. Certainly very little had been done for them, and the remark was frequently made by students, "I would like to register, but why should I, there is nothing in the Association for me!" It seemed to him that the attraction of students to the Association was one of the most desirable things, for if they could get the students, success was assured. He thought architects not connected with the Association must feel on many occasions that something was wanting in their make up as an architect, and that something was membership in the Association. He believed that in the course of time, perhaps before they secured any amendment to the act of incorporation, men would be proud to call themselves registered architects. Other institutions had prospered all along the line without restrictive legislation, but in all those cases it would be found that attractions of some kind had been provided to induce and maintain the membership. He thought the medal and travelling scholarship he suggested would prove a very strong inducement to students, and have the effect of reinforcing the ranks of the Association. He thought a policy such as he suggested was quite practicable, and would have the effect of building up and strengthening the organization, and placing it in a better position to assume the new responsibilities which would undoubtedly fall upon it when, in the future, the desired amendment was secured.

Mr. Helliwell suggested the advisability of discussing the various clauses of Mr. Baker's motion seriatim.

The President pointed out that the matter could only be dealt with as a notice of motion, and therefore it might not be well at this stage to spend time in discussing it clause by clause.

Mr. Pearson said that before Mr. Baker spoke the idea seemed to be to cut expenses down; Mr. Baker's proposition seemed to be to put them up. Mr. Baker certainly had a very rosy view of the future, which it was to be hoped was well grounded, but, speaking for himself, he thought the programme outlined was almost too much for the Association to undertake.

Mr. Burke was of the opinion that it would be necessary to have a very much larger income than that possessed at present if the Association was to embark in all the projects outlined by Mr. Baker. Even to continue its existence it was necessary either that the membership fee should be increased or the membership list augmented; there were only the two courses open, as far as he could see.

Mr. Wickson said it did not necessarily follow that all of the suggestions embodied in Mr. Baker's motion should be adopted. He thought that the idea of according some recognition to the man who had done the best work during the year, if confined to registered architects, would be a very strong incentive to good work by members of the Association. Some of the other suggestions, although good, might not be practicable just now, such, for instance, as establishing a headquarters of their own, which would be open to the objection that it was available to the Toronto members only, and therefore would not be likely to meet with support from outside members. But the mere fact that Mr. Baker's suggestions might not be accepted in their entirety was no reason for not considering such of them as seemed valuable.

The Registrar, Mr. Langton, thought there could be no possible objection to the appointment of a committee to consider Mr. Baker's suggestions, and, indeed, any other ideas on similar lines that might occur to them in the course of their discussion. He had had an opportunity of seeing Mr. Baker's proposals before they were brought before the meeting, and at first sight he had been favorably impressed by them, but on careful consideration, and speaking as one who had an intimate knowledge of the financial affairs of the Association, he felt alarmed at the largeness of the idea of establishing a scholarship and a benevolent fund. The matter of the medals, he thought, was quite within their resources. If Mr. Burke's suggestion was adopted, and the offices all made honorary, it might also be possible to have a room as suggested by Mr. Baker. The question was one on which much might be said on both sides, and as there were some gentlemen in the room, not members of the Association, but who had some ideas regarding what the course of the Association ought to be, this might be an opportune time to hear their views.

Mr. Wells, one of the gentlemen referred to by Mr. Langton, said that the matter now before the meeting opened up a very wide field for discussion. He remembered in reading the report of last year's convention that one member had expressed himself to the effect that he was getting tired of paying fees merely to afford students an opportunity of being examined, entirely for their own benefit, and for that reason contemplated dropping out of the Association. He thought that Mr. Baker's point was very well taken. He did not suppose that even the most ardent member would claim for the Association that it had hitherto been a howling success, nor did the attendance on the present occasion evidence that such was the fact. He thought Mr. Baker had hit the nail on the head when he said that without the students the Association could not look forward to a very prolonged or useful existence. Of course the older members might carry it on for a time, but without an accession from the ranks of the younger architects it could hardly be expected to prolong its existence more than fifty years at most. So far they had not succeeded in getting the amendment to the charter which they sought, and, as far as he could judge, there did not seem to be any immediate prospect of their doing so. They might possibly secure it in the course of fifteen or twenty years, but even if they did he questioned whether it would be a good thing for them. In the meantime, how was the Association going to get along without the young men. The President appeared to regard the history of the organization with entire satisfaction, to think that it had done nothing which it ought not to have done, and had left undone nothing it ought to have done. This, however, was not apparent to some of the younger men in the profession. It therefore seemed to him that Mr. Baker's proposition that something should be done to encourage the younger men to join was a good one. He was aware that the question of ways and means presented difficulties, but they were not insuperable. He thought that the great trouble was that at the outset the whole

idea was to get restrictive legislation, and that with that in view everybody then practising had been taken in; in fact, at that time he believed there were not more than one or two men of any prominence who remained outside of the Association. Consequently things had been lively for a time. It had been found impossible, however, to deliver the goods according to contract, and for the last few years the enthusiasm had apparently been on the wane, and at the present time he was unable to observe any indications of any tremendous enthusiasm. It had occurred to him that if the Association could be re-organized on a different basis, with different ideals; if it would get down to business and strike off the roll the delinquents, and settle down to a business-like course of procedure, it might be productive of much good. Of course, all the things proposed—the benevolent fund, the scholarship and medals, and the rooms—could not be had at the start, but would have to be carried out as opportunity offered. He thought the true province of such an Association was that recognized by the older societies, both in England and the United States—not the securing of legislation from some government, but the encouragement of the profession by awarding scholarships and medals, and in other ways advancing its interests. There was no doubt that young men would work very hard for the honor of winning medals; where they were awarded there was never any scarcity of competitors for them, although they carried nothing but honor. He thought the Association might devote more attention to the art side of the profession and its improvement, as that was something which appealed to the young men with more force than such topics as fireproof construction, which could be read up in books.

Mr. Bond, another of the non-members, deprecated the idea that he or his associates had come to criticize the course of the Association in any spirit of antagonism. He had always been under the impression that the primary idea of the Ontario Association of Architects was to secure legislation in their favor. He did not think that was right; it seemed to him that the true province of such an association was to become more and more an educator of the public. He advocated the giving of popular lectures at some central part of the city as a means of enlightening the public as to the value of good architecture. The idea of legislation was good, but there was no use in trying to force it; if it was a good thing it would come of itself. He did not think the writing and reading of papers made up from journals which all had the opportunity of reading for themselves had much educative value. Reference had been incidentally made to the fact that when Mr. Shortt lectured before the Toronto Chapter there was an attendance of sixty, whereas the average attendance was ten or twelve. He thought this showed the desirability of securing as lecturers men capable of presenting their ideas in an attractive form, even though they might be men outside of the profession. Referring to the qualifications of architects, he said it had been his misfortune to work with two men whose qualifications were attested by an institute of high standing, but who nevertheless had proven themselves conspicuously incompetent. He did not pretend to say that this fact condemned the institute in question, but it did show that the diplomas held by the men in question proved nothing.

Mr. Gregg said he was unable to understand the position of those represented by the gentlemen who had just spoken. Why did not these gentlemen come into the Association and help to do the things they thought so desirable? The very first sentence of the Act of Incorporation set out that the object of the Association was "to ensure a standard of efficiency in the persons engaged in the profession of architecture, and for the furtherance and advancement of the art of architecture." Surely that was broad enough to cover all their aspirations. He saw no room for such discussion as was being carried on; the thing to do was for all to join together and work to make the Association fulfil its avowed objects.

The Registrar, Mr. Langton, thought it was a mistake to say they had not devoted themselves to art, for that as well as construction had been dealt with. All of the papers he had himself contributed had been devoted to the artistic aspect of the profession of architecture, and many similar papers had been contributed by other members. He thought Mr. Gregg was right, and that the gentlemen who wish to look upon architecture as an art would find themselves in place as members of the Association.

Mr. Bond objected that, under the rules which had so far governed, the young men, even if they came in, would have no influence. Of course, that was something which might be removed by the resolution just passed, making members of five years' standing eligible for the Council.

The Registrar pointed out that it was possible to exercise a great deal of influence without being a member of the Council. The reading and discussion of papers and the suggestion of desirable courses of action was not confined to members of the Council.

Mr. Baker thought the Association might congratulate itself on the presence at the meeting of Messrs. Wells and Bond, and the opportunity those gentlemen had given us, in the language of Burns, "to see ourselves as ithers see us." Messrs. Wells and Bond had to some extent criticized the Act under which the Association was incorporated. He thought there was nothing the matter with the Act at all, and it was a mistake to suppose they could not work efficiently under that Act. Perhaps, indeed, if they had gone ahead under it without seeking amendment they might even now have been in a more prosperous condition. He felt, as Mr. Burke had said, that they must either resign themselves to falling into decline and death by slow consumption, or adopt some radical changes and infuse new life into the organization. As to the question of funds, it seemed to have been assumed by most of those taking part in the discussion that his proposals necessitated the expenditure of large sums of money. Now, he would ask, what did they call for? In one case the Government was to be asked to provide funds for a medal. That would be without cost to the Association. Then, as to the benevolent fund, it would be observed that he had coupled with it an increased membership fee. A very small amount of money would be sufficient to found the benevolent fund, and it was only because of its great usefulness that he had suggested it. As to the establishment of a home of their own, he thought that was most desirable; the Association had now been in existence some ten years or more, and he did not think they ought to continue year after year to be under an obligation for the use of the rooms they occupied without paying anything for the privilege. Then, as to the point made by Mr. Bond, that passing the examinations of this or any other Association was not necessarily a proof of a man's competency, he thought the inference sought to be drawn was hardly fair. It was well known that there are exceptions to every rule, and no doubt some men would pass the examinations who were not brilliant, but at least they would possess the knowledge they had acquired to pass, and the possession of the diploma was absolute proof to the public that they were to that extent qualified. He thought Mr. Bond might in fairness have said he knew numbers of other men who had gone through the same course who were in every way successful and competent architects. Most of the eminent men in all professions to-day were members and graduates of institutions similar to their own. There was always a number of men of the aesthetic class, who objected to having anything to do with the practical, business-like side of architecture. They were excellent men, their work was always delightful to look at and a joy for ever—meo like Jackson and Norman Shaw—and no doubt they advanced the standard of architecture. But, after all, there was a practical side, and this Association was intended to protect the public; it was in every sense pro bono publico, no matter what might be said of its selfishness, which might, in a sense, be true; in a broad sense it was not true. Everything that had been done was for the good of the public, and would work out for

the good of the public, and if they went on there was no necessity for changing the constitution at all. They had failed in securing the legislation asked for, but there was no reason why they should not go on and make the most of their Act in its present form.

Mr. Helliwell regarded the discussion which had been taking place as one of the most important which they had ever had. It had become apparent that the point was reached when they must either sink or swim, and with a view to swimming he thought the suggestions made were exceedingly valuable. He thought Mr. Langton had put the pith of the whole thing into a sentence when speaking of the Toronto Chapter, that if they had a right to exist, let them prove it; if they had not that right, let them die. He thought that applied equally well to the Association as a whole. A gentleman in conversation with him had remarked that the Council was the whole Association, and that ought not to be, and instanced another society, in the old land, where, while the Council had the responsibility of conducting affairs, yet standing committees were appointed to deal with practical questions and confer with the Council. It seemed to him that some of the questions now brought up might very well be dealt with by such a committee, who would deal with them vigorously and effectively. He thought it would be a great misfortune to let the Association die a natural death, because, as had been pointed out, there was really nothing to prevent it achieving beneficent results. He sincerely hoped that it would not be allowed to drop without earnest effort to accomplish the practical results which he felt confident were attainable.

Mr. Gemmell said that while the President, the Treasurer and some others were pointing out that it was hardly possible for the Association to do more than eke out an existence on its present resources, Mr. Baker was seeking to inaugurate a kind of new dispensation, and to induce the Association to embark in a number of new projects. No doubt, if there were ample funds in hand, it would be justifiable and perhaps wise to undertake many things. The idea of medals, he thought, was a good one, and something quite in line with the policy pursued by similar associations elsewhere. He thought the most important thing for the present was to raise the fees sufficiently to place the society on a self-sustaining basis, which he thought would enable it to assume a more commanding position in the eyes of the general public. It had been suggested that the term "Registered Architect" had been too much despised, and that if the Association had gone to work with the powers conferred by its Act, without amendment, and stuck to it, they might have found themselves nearer the realization of their hopes than was now the case. He advocated proceeding now on those lines, by endeavoring in all available ways to educate the public and the rising generation of architects, and he hoped that the younger members of the profession would throw in their lot with the Association, and try to make the title "Registered Architect" so distinctive that in time the government would without pressure see the wisdom of passing some such legislation as that which had been sought, but thus far without success. The immediately pressing point, he thought, was, "What can be done to prevent the continuance of this leaking away of the funds of the Association?"

Mr. Wickson believed that if every member would make use of the title "Registered Architect" on his office stationary, his sign and in other available ways, the public would be led to inquire the meaning of the title, and in that way would come to know more about the Association and its objects than they did now. He quite agreed with the policy of accepting the situation, and going to work under the powers they possessed and making the most of them.

The Registrar, Mr. Langton, was unable to agree with the inferences apparently drawn by Mr. Bond from the experience he had related regarding the Royal Institute men who had shown themselves lacking in ability. It was not reasonable to argue that failure was the result of too much education instead of too little ability. At the time when he first accepted the registrarship of the Association he had done so without any great degree of enthusiasm as to its educational features, but in the performance of the duties devolving upon him in that office he had grown to regard the educational scheme as something of great value to the public. At present, however, it was out of the question to hope to secure that amendment to the act, for those with whom the power of making the amendment lay did not seem able to understand that it was possible that the Association desired the amendment for motives of public spirit and not for some selfish ulterior reason. There was, therefore, nothing for it but to accept the situation and make the best of it. He was thoroughly in accord with the views of the young men, of whom he accounted himself one, that architecture is an art. He would go so far as to say that no man could be a good constructor who was not an artist. If it is to be a question of talking about the art of architecture he would always be glad to attend meetings Now that they were forced to abandon the idea of securing the amendment, he thought their object should be to strengthen and draw closer the bonds which held together the best and most thoughtful members of the profession, and to devote themselves to educate the public in a just appreciation of that which was best in architecture.

Mr. Bond disclaimed any intention whatever of decrying the value of education, but desired to point out that the passing of examinations and the holding of certificates or diplomas did not necessarily afford indisputable proof of the competency of their holder. He was fully in accord with the other ideas put forward by Mr. Langton.

Mr. Baker thought Mr. Bond ought to withdraw his statement. That gentleman had met two members of an association who had proved to be incompetent. He would undertake to produce for Mr. Bond 100 men who were not members of any association who were most utterly ignorant and lacking in qualification.

Mr. Bond said he had no intention whatever of casting any slur upon the institution in question, but was merely drawing attention to an instance which had come under his notice.

Mr. Gemmell said he had heard that not less than six or seven of the young men brought up under the influence of the Ontario Association had been able to take and hold positions in the city of New York and other parts of the United States, with credit to themselves and to the Association. He was not able to give the names, having merely heard it mentioned incidentally.

Mr. Wells said there was no doubt that was true, but he thought the young men themselves were entitled to a certain degree of the credit, their success being due in a very large measure to their own effort.

Mr. Bond said that while he did not wish to appear ungrateful to the Association, he felt bound to say that he had learned more by burning the "midnight oil" and in sketch clubs than other ways, and he thought students all derived the greatest good from their own individual effort.

Mr. Langton was glad Mr. Bond had raised that point, because among the good things the President had enumerated of the Association, he had not mentioned that, in drawing up the curriculum, it had made a list of things that an architect ought to know, which was very helpful in directing individual study and effort. Speaking for himself, he was glad to acknowledge that he had been very much helped by merely assisting to draw up that curriculum.

Mr. Burke said that something must be done in order to avoid the defection of members. Members complained that the Association was run on lines that were too expensive. He found that many objected to keeping up their membership for this reason. Others thought they were not reaping any material benefit, and as they did not see any cash value in the concern to them, refused to pay their fees. He was forced to the conclusion that unless some radical change is adopted the income of the Association would not be sufficient to meet the expenses, and a constant deficit would result. The only way to make ends meet, with the prospective small income at our disposal, would be to have no paid officers, the work being done by an honorary secretary, and expenses cut down to a minimum. Certainly the work of the Association cannot be carried on indefinitely if it is to be conducted on the existing lines. That was something which could not be ignored. He thought the suggestion of Mr. Wickson, as to making use of the title "Registered Architect" on signs and letter-heads, &c., was a good one. If the members agreed as an association to adopt that course he thought it would have the effect of inducing these members to keep up their subscriptions as a matter of self protection, which would provide the funds necessary to carry on some of the desired projects.

Mr. Wickson, following on the line of Mr. Burke's remarks, pointed out that at first, when everybody was in the Association, there was no incentive to use the title, whereas now that a number had dropped out there was something distinctive about it. He thought the adoption of the use of the title, in conjunction with some of the projects suggested by Mr. Baker, would advance the interests of the society.

Mr. Burke then moved the following resolution, "That it be an instruction to the Council to take into consideration the advisability of the assumption by members of the Association of the title, "Registered Architect," and that if upon inquiry it is found to be a popular suggestion, the Council issue a notice to members in good standing to assume the title."

Mr. Wickson seconded the motion.

The President said that while Mr. Burke's motion was a good one, yet there was at present a motion before them, which must be dealt with before taking up that of Mr. Burke.

Mr. Baker explained that the reason he had moved for a committee instead of referring the matters to the Council was that the Council had always enough work on hand, and a committee would be better able to deal with the proposals made.

Mr. Dick thought it was desirable that every member present should express his views on the subject matter of the discussion; he had to confess his consciousness that his own ideas needed crystallizing before he gave utterance to them. He regretted very much the fact that another appointment rendered it impossible for him to be present in time to hear the President's address, but he had been very much interested in the discussion which was in progress when he entered the room. He thought Mr. Baker's suggestion that a committee outside of the Council should be appointed to consider the proposals made was a good one; the committee to confer with the Council and act in concert with it. From the remarks he had heard, he gathered that there was a general feeling that it was time to cease, for the present at least, the efforts to obtain amended legislation, and that the energies of the Association should now be devoted to bringing itself more prominently before the public, with a view to spreading a wider knowledge of its aims and desires, and, perhaps, to some extent at least, becoming an educator of the public taste. The people who furnished the money for the erection of buildings in many instances have very little artistic taste, and were chiefly actuated by a desire to obtain for their money a building that would yield the largest possible return for their investment. Now, something more than that was required of the public; it was desirable that they should have an intelligent interest in architecture, and should be able to criticize the designs submitted to them, and, in the case of competitions, be able to select with some degree of certainty the best of a number of designs submitted. Of course, it was well known that at present, in many instances, by no means the best designs were chosen. Even intelligent and educated persons take so little notice of architectural objects that they will often mistake for a view of some building with which they are perfectly familiar a drawing or photograph of some other building which has not the slightest resemblance to the one they have in mind. That showed how little interest they took in architecture. It was surprising how many people did not know enough of architecture to enable them even to distinguish between Gothic and Classic. Now, something had been said of popular public lectures. There were some difficulties about that. Architects, as a rule, were not facile writers or speakers. This was an attainment which an architect actively engaged in the practice of his profession had little opportunity of acquiring. It was his opinion that in the preparation of papers to be read too little attention had been given to the aesthetic side of the question, and too much condensation of books indulged in. It should be borne in mind that the preparation of a really valuable paper was a task not to be lightly entered upon, but one that involved a great deal of work and study. It was no use sitting down hurriedly and throwing together a few stray thoughts; a paper prepared in that way could not be expected to benefit anybody. It was true that some men had an inborn genius for throwing forth flowery effusions, but it would generally be found that such productions lacked the solidity and accuracy which were necessary to make them of value. The little interest evinced in the proceedings of the Association did not afford much encouragement to anyone to take the time and trouble necessary to prepare a really good paper, but he had no doubt that if the effort were made, gentlemen could be found in this city both willing and able to prepare and deliver lectures on architecture, which large audiences would be glad to come to hear. He had been much gratified at the large attendance at Rev. Mr. Shortt's lecture under the auspices of the Toronto Chapter, and thought it would be a good thing to arrange for a course of such lectures, because no doubt those who were present on that occasion would be glad to have another opportunity of listening to a lecturer who, in addition to knowing his subject, was skilled in the art of public speaking. A great deal had been said about the meagre number of good designs submitted in competitions, and the large number of inferior designs executed. It had to be remembered, however, that the conditions prevailing in this country were somewhat different to those existing in England, for instance. It was well known to all that an architect in this country had a great deal more to do than an English architect; he had to be not only the architect, but clerk of the works, and, in many cases, practically foreman of the trades. When a man's time was taken up in superintending the work and looking after all sorts of petty details he had too little time left in which to study his designs. He might burn more of the midnight oil, but that was something to which as a man grows older he is less inclined, and which he becomes physically less capable of doing with justice to himself. Speaking with regard to the future of the Association, it might be that the present scale of fees was too low, but he did not think it would be politic under existing circumstances to raise it. As to the retrenchment in expenditure, the expenses at present were not very heavy, and there was still a surplus on hand, and he thought things might very well be allowed to run along another year or two on the present basis. He felt sure that all would agree that no man could better fill the position of Registrar and Librarian than Mr. Langton, and that the salary was no adequate remuneration for the time and trouble which the office entailed. Then as to the use of the title "Registered Architect." The general consensus of opinion at the time the act was passed was that they would be stultifying themselves by using the title, and, as had been pointed out by Mr. Wickson, at that time it carried with it no distinction whatever, because as every Tom, Dick and Harry through the country was taken in, there was no distinction in using that title. But if the names of all those who had not paid their fees were dropped, it would reduce the number very much, and he did not feel at all sure that Mr. Burke's suggestion was not a good one; at all events the Council might consider the advisability of now adopting it. He thought a great deal would depend on the number who would agree to make use of the title, whether it would be wise or not to adopt it, and it would be well to ascertain what number of members of good standing were prepared to fall in with the suggestion.

The President then put Mr. Baker's motion for the appointment of a committee, which was carried.

The President then put Mr. Burke's motion, with regard to the assumption of the title of "Registered Architect," which was carried

The Convention then adjourned until 10.30 o'clock on Wednesday morning, the 18th inst.

SECOND DAY.

The second day, Wednesday, was occupied for the most part by the papers; "The Advancement of Public Taste in Architecture," by Mr. J. W. Siddall; "Plastering, Plain and Ornamental," by Mr. W. J. Hynes, and "Terra Cotta," by Mr. M. J. Hynes. These papers, which were discussed at some length, will appear in subsequent issues of the CANADIAN ARCHITECT AND BUILDER. A luncheon was also discussed at some length, and with apparent interest. It was discovered by a scientific gentleman present that 45 per cent. of architects, 66 per cent of the staff of the School of Practical Science, and 100 per cent. of reporters for the CANADIAN ARCHITECT AND BUILDER are smokers. After the papers were read, Mr. Harkness, of the School of Practical Science, gave an exhibition by steroptican of some of the slides belonging to the Architectural Department of the School. Business was then resumed.

Mr. Gregg said there was a matter he desired to bring before the Association. As they were no doubt aware, the Quebec Association had got further in the matter of legislation than we in Ontario, having obtained an act forbidding the use of the title "Architect" in their province except by members of the Quebec Association. It might happen if there was a competition in Montreal, open to architects in Ontario, or in the case of any member of the Ontario Association removing to Montreal, that complications might arise, and he would therefore ask that the Council be instructed to communicate with the Quebec Association, asking that members of the Ontario Association in good standing should be recognized as architects and members of the profession in the province of Quebec.

Mr. Belcher seconded the motion, which was carried.

On motion by Mr. D. B. Dick, seconded by Mr. J. E. Belcher, moved the following resolution, which was carried: "Resolved that the members of this Association have heard with deep regret of the death of Mr. Thomas Fuller, the late chief architect of the Department of Public Works for the Dominion, who was a member of this Association, and for some time a member of the Council. They mourn his loss as that of a man whose genial disposition and personal worth endeared him to all who came in contact with him, and who in the course of a long and honorable career did much to raise the standard of architectural design and practice, both in Canada and the United States." Ordered that this resolution be engrossed in the minutes and a copy sent to his family.

On motion by Mr. Baker, seconded by , it was resolved that the following be a recommendation to the Council:

"That the Lieutenant-Governor be made an honorary member of the Association.

"That the City Council be urged to expedite the printing and issuing of that portion of the city by-laws which relates to building and kindred matters.

"That a register be provided so that those attending meetings may register their names on entering, and a correct record of those attending be kept in that way.

"That clause 1 of the by-laws passed by the Association be altered to read: '1. The Association shall meet each year, on the first Tuesday after the 10th of each month, except June, July, August and September, the meeting in January to be the annual meeting, at such time and place as shall be determined by the Council and designated in the notice calling the meeting.'"

The six members of the committee appointed under Mr. Baker's motion on the previous day were then named by the President. They are Messrs. E. Burke (convener), H. B. Gordon, W. A. Langton, J. A. Pearson, J. W. Siddall, and Eden Smith.

The election of members of Council then took place, resulting in the election of Messrs. F. S. Baker and Grant Helliwell, of Toronto, and Mr. Fred. Henry, of London.

The auditors, Messrs. H. Langley and W. R. Gregg, were thanked and asked to act again.

Votes of thanks were also passed to the Hon. Minister of Education for granting the use of the room of meeting, to Professor Galbraith, the principal of the School, and Messrs. C. H. C. Wright and A. H. Harkness, of the Architectural Department of the School. The meeting then closed.

THE BUILDER

[THIS DEPARTMENT IS DESIGNED TO FURNISH INFORMATION SUITED TO THE REQUIREMENTS OF THE BUILDING TRADES. READERS ARE INVITED TO ASSIST IN MAKING IT AS HELPFUL AS POSSIBLE BY CONTRIBUTING OF THEIR EXPERIENCE, AND BY ASKING FOR PARTICULAR INFORMATION WHICH THEY MAY AT ANY TIME REQUIRE.]

Preparing for Roughcast.

To prepare the outside of a frame building for roughcasting, great care should be taken to have the ground work dry and well put together. If possible, the framework should be erected on a stone or brick foundation, but where this cannot be done and where the building must rest on timber posts or piles, the posts or piles should be put in the ground at least four feet, or deeper in places where frost would likely strike deep enough to lift the posts. These posts should not be more that eight feet apart—six feet would be much better—and they should be of good size, not less than eight inches in diameter. Where posts are used, their tops should not be more than six inches above the ground grade, and they should be leveled off all round to receive the sills. While two tiers of 2 x 4 inch scantling would answer very well—if bedded in mortar—for the sills of a balloon frame on a stone or brick foundation, it will not do to make use of anything less than timbers having a 6 x 6 inch section for sills that are to rest on posts, as lighter timber would be apt to sag between the posts, to the detriment of the building, and the roughcasting in particular. The studding employed in building a balloon frame which is intended to be boarded inside and outside, need not be closer than three feet, but the boarding should be dry, the edges laid as close as possible, and the whole well nailed to the studding. It is not necessary that the boarding be nailed on diagonally, as is practised in some communities, as horizontal boarding, if joints are kept tight and the whole well nailed, has all the advantages of strength and rigidity that diagonally laid boarding has; besides, the former method is more economical in material and labor. If the groundwork is now ready to receive the lathing, in accordance with the foregoing, the first thing to do is to cover the whole boarding with one of the many kinds of building paper—it is suggested that "tarred" paper be used, though this is optional—wrapping it well around the corners, and around the studding and boarding at all the openings before the frames are placed in position. Much of the warmth of the house depends on the honest and thorough manner in which this papering is performed, therefore great care should be exercised in doing the work. Strips of lath may be nailed here and there on the paper to hold it in place until the lathing proper reaches it. The lathing should then be nailed on at an angle of about 45° with the line of foundation. The laths should be spaced to about one inch apart and should be well nailed to the boarding. This will not only hold the paper rigid in place, but it will aid very much in strengthening the whole structure. Another tier of lath must then be nailed over the first lathing, and must be put on diagonally in a contrary direction to the first lathing. This should be well nailed to the other lath, thus bracing the building in the opposite way. When the work is well done, the walls will be quite rigid and immovable. It is considered by old hands the better way to leave out the window and door frames until after the first layer of lath is nailed on. This admits a "key" of the plaster to get in behind the outside casings, cutting off any chance for wind making its way into the house from behind the window or door frames. Of course, the second layer of lath would have to be fitted against the casings, which will require to be thick enough to receive lath and two coats of plaster. Water table, corner boards and cornice boards may be nailed in place over the paper before any lath is put on, but they must be sufficiently thick to receive two thicknesses of lath and two coats of plaster, or be padded out with band mouldings, or like the casings, have the thickness of a lath as furring behind them. One of the main things to be considered in planting finished stuff on a building to be roughcast is to have all the work nailed well to the boarding and timbers.

Roughcasting.

The first coat for this kind of work should consist of rich lime mortar, with a large proportion of cow's hair well mixed through it. The mortar should be made at least four days before being used, and longer if possible. The plasterer when applying the mortar should be sure and use pressure enough to force the mortar well into the keys or interstices of the lathing in order to give it good bonding. The face of the work must then be scratched to form a key for the second coat, which must not be put on before the first coat is thoroughly dried out. The mortar for the second coat is made the same as for the first coat, and is applied in a similar manner, with the exception that the wall must be sprinkled with clean water before the second coat is put on, in order to keep the second moist and soft until the "dash" or roughcast is put on. The dash, or roughcast, is composed of fine gravel, washed clean, and perfectly free from all earthy particles, and mixed with pure lime and water until the whole is of a semi-fluid consistency. This is mixed in a tub or pail, and is dashed against the wall with a wooden float about five or six inches square. While the plasterer throws on the dash, with the float in his right hand, he holds in his left a common whitewash brush, which he dips into the dash from time to time and then brushes over the mortar and roughcast, which gives them, when finished, a regular, uniform color and appearance. For 100 yards of roughcasting, finished as above described, the following quantities will be required: 1,800 laths, 12 bushels of lime, 1½ barrels of best cow-hair, 1¾ yards of sharp sand, ¾ yard of washed gravel and 16 pounds of cut lath nails 1¼ inches long. A quarter barrel of lime putty should be mixed with every barrel of prepared gravel for the dash. The dash may be colored to suite taste by using proper pigments. To color 100 yards in any of the tints named herewith use the following quantities of ingredients: For a blue-black, 5 pounds of lamp-black; for buff, 5 pounds of green copperas, to which add one pound of fresh cow manure, strained; and mixed with the dash. A fine terra cotta is made by using 15 pounds of metallic oxide, mixed with 5 pounds of green copperas and 4 pounds of lamp-black. Many tints of these colors may be obtained by varying the quantities given. The colors obtained by these mixtures are permanent; they do not fade or change with time or atmospheric variations. Earthy colors, like Venetian red and umber, soon fade and have a sickly appearance, and they tend to weaken the mortar. Buildings roughcast in this manner are warmer than when covered with siding or shingles, and are less expensive, quite as durable, and more fire-resisting.

Some Points in Balloon Framing.

There are several ways of making corner posts for a balloon frame building, some of which have considerable merit, and others that ought not to be permitted to obtain. It is very bad construction to simply spike two 2″ x 4″ studs together to form a corner 4″ x 4″ in section, and then spike a third piece on these to receive

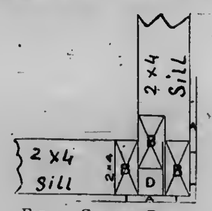


Fig. 1—Corner Post.

the boarding or lath on one of the return angles. By this method, one of the sides of the wall is dependent altogether for its adherence to the corner post to the draw of the nails or spikes holding the third piece to the doubled studs. Sometimes, though not often in these days, the corner post is formed of 6″ x 6″ timber, which has a rebate of 2″ x 2″ taken out of the internal angle in order to allow of the inside boarding or lath-

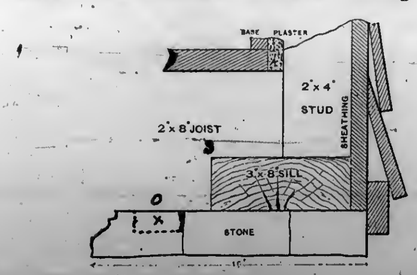


Fig. 2—Showing Sill.

ing being nailed to it from both walls. This is a very good method, but is a costly one, and often an inconvenient one, as 6″ x 6″ posts are not always obtainable. A better method, or at least a more convenient one, and one that is less expensive is shown at Fig. 1. Here we make use of three 2″ x 4″ studs, B B B, to

form the corner, and by this arrangement we get all the conditions required to make a good solid corner. D shows a hollow space between the two outside studs, and A shows the outside boarding, which may be dressed and matched stuff, or it may be rough boarding. The centre stud projects out just two inches, and forms a good backing to nail to from one side, while the inside stud forms a good basis to nail to from the other angle. The projecting stud may be notched out at the proper height to receive the joists, which would give the latter a solid bearing. This method of forming a corner is simple, cheap and effective. There are a number of current methods employed in laying down sills for balloon framing on a brick or stone foundation. At Fig. 2 is shown one method that may be considered a fairly good one, but unnecessarily costly, as a 2″ x 4″

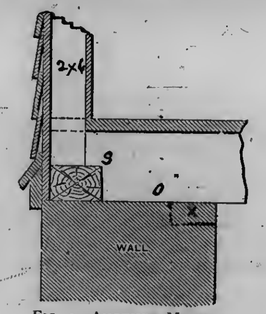


Fig. 3—Another Method.

sill would answer just as well and the notching out of the joists could well be dispensed with. Fig. 3 exhibits another method in which there is not so much timber employed, but the same amount of notching is required. While both these methods are effective, as the full strength of the joists is retained because of its resting on the wall at O, it is better when it can be done to have a 2″ x 4″ hard timber at the point X, as this will prevent any splitting of the joists at the angles S S. Two other methods, taken from Magginis' "How to Frame a House," are shown at Fig. 4. The first

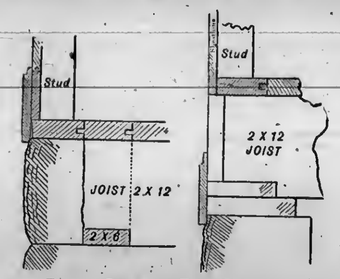


Fig. 4—Showing Two Methods.

method shows the joists resting on a 2″ x 6″ sill, and having a portion of the foundation wall built up the depth of the joist to the foot of the studding. This method is not to be commended for general use, but there are sometimes situations when its use is necessary, and it is to meet these conditions that the author intends it. The second example is much better. The sill consists of two pieces of plank bedded in the wall, the lower plank being quite wide, the upper one being much narrower. By this arrangement the joist gets a bearing on the lower plank, which gives the whole strength of the joist to resistance of floor pressure. At

Fig. 5 is shown a method that is better adapted to balloon framing than any of the foregoing examples, and it is the most economical. Here, the sill is simply laid on the foundation wall—bedded in mortar—and properly levelled up; the joists are sized at the bearing points, laid on in their proper places and firmly toe-nailed to the sill. The studs may then be notched over the joists at the ends of the building, or they may stand

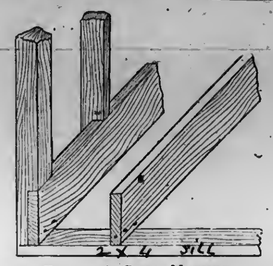


FIG. 5—A GOOD METHOD.

their whole width on the outside of the joists, the latter being spiked to them. This is the better way when nothing interferes with adopting it.—In all cases the studs should foot on the sills, and if the spacing will admit of it, the studs should stand alongside the joists and be well spiked to them. If the wall is wide enough, there might be two tiers of sills, one on the outside edge of the wall and the other on the inside edge. This would give a double bearing for the joists.

LONDON BUILDERS' EXCHANGE.

THE annual meeting of the London Builders' Exchange was held on the afternoon of the 16th inst., in the Exchange rooms. There was a very good representation of the members present. After the ordinary routine business had been disposed of, the auditors' report was received, showing receipts for the year $405, disbursements $375, with a balance on hand of $30. The report was certified by Messrs. John Shopland and Wm. Tytler, auditors.

The election of officers resulted as follows: President, William Jeffery (re-elected); 1st vice-president, Scott Mutray (re-elected); 2nd vice-president, William Smith (of Smith Bros.); secretary, Geo. S. Gould (re-elected); treasurer, James S. Luney (re-elected); directors, Messrs. Thos. Jones, Joshua Garrett, William Tytler, Ernest Fitzgerald and Henry Stratfold; auditors for the ensuing year, H. C. Simpson and John Shopland.

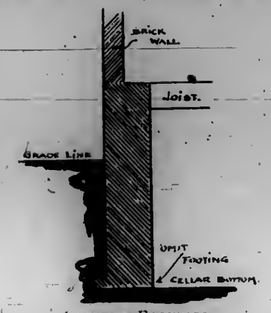
The President, in his address, gave a brief resume of the principal business that had come before the Board during the year, congratulated the Exchange upon the steady progress that had been made, and strongly emphasized the fact that although every member of the corporation had been benefitted through belonging to and meeting with the Exchange, still there were far greater benefits to be derived by each trade being properly organized as a section of the Exchange, and every member of every branch making it a point to be punctual at each sectional meeting, and using their influence to improve the standing of their craft. The matter of a Provincial Association was also broached, and in the near future we hope to obtain the opinions of the other Exchanges along this line.

Under "Good and Welfare," it was decided to have a banquet as soon as possible, and a good committee was appointed to make the necessary preparations for the same.

GEO. S. GOULD, Secretary.

INTERIOR FOOTINGS.

IT is customary in light buildings to put footings on the cellar side of walls. Considering that the weight of the superstructure bears directly on the outer half of the foundation wall, and that from 9 in. to 12 in. of it only are required to carry the ends of the joists, these internal footings seem to be unnecessary, and, when used, a great inconvenience and useless waste of stone.

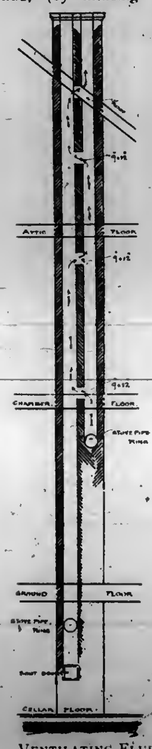


INTERIOR FOOTINGS.

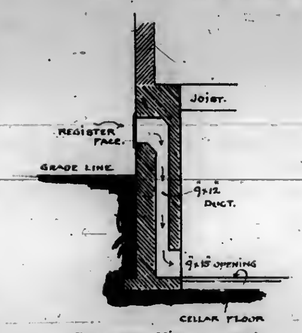
The concrete or wooden cellar floor must cover them, causing a diminution in the height of the cellar and an additional expense to deepen the cellar if a high basement is required. Interior chimneys of from 40 to 50 feet in height should have their bottom at least one foot below other walls, to save trouble with floor.

METHOD OF VENTILATING CELLARS.

THE disagreeable odors from a cellar laundry or vegetable room can be drawn off by an arrangement of a double flue, (by utilizing the passage of smoke from one flue to the other, forming a double loop). The long flue runs from the basement upwards. Commence the kitchen flue below ceiling line. In the "wafe" leave a hole 9 in. × 12 in. high, 3 feet above the kitchen thimble; 7 feet above this hole leave a a similar one, then 5 feet above it another, and finish with one 3 feet above the last one. Should the height of the chimney be low, then the proportional distances be-



VENTILATING FLUE.



BASEMENT VENTILATION.

tween the wafe-holes will be reduced. The continued warmth and smoke of the kitchen flue the year round will ensure a perfect draft for venting the cellar. The introduction of fresh air into cellars is only thought of as coming via the windows or the area door. Where the flues are extended to the cellar level, and are applicable for ventilating purposes, the building of duct flues in the external walls will create a channel for the colder outside air to drop into the cellar. The warm vent flue, causing an upward draught, will draw the air from outside and into the cellar. In building the stone walls, commence a 9 in. × 12 in. flue starting from the floor line, and extend two feet above the grade line, turning its outlet externally into the finished stonework. To prevent foreign matter clogging this air-shaft, cover upper vertical front with a register

plate, the lower end being open to cellar. Vent flues in stack should be placed as near floor as possible, and should be controlled either by a door or register face. A larger flue of this type would be suitable as a cold air inlet to furnaces.

LONDON MASTER PLUMBERS' ASSOCIATION.

THE following are the officers elect of the above association: E. Russell, president; C. Needham, first vice-president; J. R. Haslett, second vice-president; T. S. Partridge, treasurer; William Smith, secretary, 265 Dundas street; William Skelly, corresponding secretary; C. W. Walker, inner guard.

HOW TO FIND THE SPECIFIC GRAVITY OF BRICKS.

In estimating the weight of any particular structure made of bricks, especially for engineering purposes, it is quite a common thing, says the British Clayworker, for the engineer to weigh half-a-dozen or so of bricks and multiply for cubic contents of the structure. This weighing may be done by the direct method, or by ascertaining the specific gravity of the bricks. When the latter is carefully calculated it is the best method, for the following reasons, but if it is not carefully ascertained (and it very rarely is) the results are of very little real practical value. In the direct method of weighing the brick there are usually several uncertain factors. The brick having remained in the office for some time becomes dry, and will not, of course, weigh as much as when it was first received from the maker, unless the latter had previously kept it in a dry place. It is safe to assume that in the building it is better to estimate on a maximum basis. At the same time, if to gain that end the brick be saturated with water, and then weighed, the result must be very unsatisfactory, as it greatly overestimates the normal weight under any circumstances if it is to be regarded as a unit in calculating the weight of any solid piece of brickwork. Very few people understand the way to take the specific gravity of a brick properly. If the brick is practically non-porous the result comes out right enough, but that is not very often the case. To take the specific gravity correctly the brick must first be well dried, not artificially, because that may lead to the formation of microscopic cracks. Then it must be weighed, either actually, or relatively as in a spring (Joly's) balance, or specific gravity steelyard. After that the brick may be immersed in water, taking care that one face of it just projects (about 1/8 in.) above the water. It should remain in the water for at least 24 hours, and longer if air bubbles still rise to the surface, and in fact until these latter cease to be formed. The brick is then fully saturated. If, during the process, the brick has disintegrated at all (as rubbers are wont to do) the water should be carefully decanted and the disintegrated particles weighed, the amount being subtracted from the gross dry weight. Now weigh the saturated brick in air, which will give the amount of water absorbed. Then weigh it in water and add the amount of the water absorbed to that weight. The weight thus ascertained must be subtracted from the weight in air, and the weight in air being divided by the product will give us the true specific gravity of the brick. The part of the work usually neglected is the addition of the amount of water absorbed to the weight in water; also experimenters habitually fail to leave one face of the brick above the surface of the water when testing for absorption.

AN ARCHITECTS' CLUB.

A SOCIAL club has been formed among the younger architects of Toronto. The first meeting took the form of an informal lunch at Coleman's new restaurant on Monday afternoon (Jan. 24th) at 1.30, where a pleasant hour was passed in discussing the organization of the club and topics of mutual interest. It is proposed to meet at lunch every Monday at the same hour, when such other meetings as may be deemed advisable will be arranged for. Those present were: Messrs. J. Francis Browne, Eden Smith, C. H. Acton Bond, Henry Sproatt, Charles Langley, A. H. Cassels, William Rae, J. P. Hynes, Sandford Fleming Smith, S. G. Beckett, J. C. B. Horwood, Arthur E. Wells, W. C. Vaux Chadwick.

LEGAL.

G. BEAUCHAMP ET AL VS. TOWN OF MAISSONEUVE, QUE.—This was an action before Mr. Justice Curran in the Superior Court at Montreal, for a balance due on the account of plaintiff, for work done, and for the price and value of the hire of certain stoves and scaffolding used in the new building of the town. The plaintiffs claimed $238.55. The defendant offered $60. The only item disputed was that for the hire of the stoves, eight in number, used for the drying of the building, and the cost of the scaffolding. The plaintiff had proved that a reasonable charge for each stove was 25 cents per day, and 50 cents per day for the scaffolding. There was considerable delay in the completion of the works, but not through the fault of the plaintiff. Several experienced contractors had established the reasonableness of plaintiff's charges. He claimed for 90 days, but the proof did not cover that period. Judgment for $226.05 and costs of suit.

SHERLOCK VS. POWELL.—Judgment by Justices Falconbridge and Street in the Divisional Court at Toronto on appeal by defendant from report of Neil McLean, an official referee, in favor of plaintiff for $166.10 and costs, in a proceeding to enforce a mechanics' lien upon certain houses on Alice street and Trinity square, in the city of Toronto, in respect of work done by plaintiff under a contract for plumbing. Defendant contended that there was one entire contract between himself and plaintiff for the plumbing work in the houses in question and other houses in Glenbaillie street, in the same place, and the plaintiff was not entitled to payment until all the work under such contract was done, and also that the work was not properly executed, etc. Held, that the contract is what must govern the parties, and not the tenders upon which it was founded, and the contract was an entire contract for the performance of the whole of the work set forth in it, for the whole price of $867 agreed to be paid, and it is plain from the evidence of the plaintiff himself that he has not yet completed the work according to the contract. Held, also, that there was no evidence of any acceptance of the work as completed or any waiver of compliance with the contract. The taking possession of the houses, with a protest against the plaintiff's assertion that his work was completed, is not an acceptance of the work or a waiver of objections to it. Appeal allowed with costs and action dismissed with costs.

The firm of Roy & Content, architects, Montreal, has been dissolved.

TORONTO BUILDERS' EXCHANGE.

THE annual meeting of the Builders' Exchange was held in their offices in the Yonge street Arcade on Monday, January 16th. The meeting was largely attended, nearly all branches of the trade being represented. Among those present may be mentioned the following firms:

Thos. Cannon & Son, David Williams, Jno. Aldridge, F. Saunders & Son, Harrison & Lewis, Geo. Wright, C. W. Neale & Co., Edward Terry, Jno. E. Webb, Smallwood Bros., Jno. Vokes, Geo. Henry, C. C. Mitchall, Jas. Scott & Son, Bather & Oakley, Richard Chalkley, Maloney & Connolly, Wickett Bros., Thomson Bros.; the Ontario Lime Association, represented by Thos. Christie; Ben Brick, Jas. Crang; the Credit Forks Mining & Manufacturing Company, represented by F. Behaviell; Jos. Russell, Robt. Rennie & Son, Duthie & Sons, Hy. Martin, Jno. M. Gander, Oakley & Holmes, C. S. Boon, the Hutchinson Brick Company, Jno. Bourne & A. P. Steward representing Ohio Stone Company.

The President, Mr. Thos. Cannon, jr., presided. The reports of the Finance Committee and the Board of Directors showed the Exchange to be in a prosperous condition, and with a steadily increasing membership.

The election of officers for the current year resulted as follows: President, Henry Martin; 1st vice-president, Thos. Christie; 2nd vice-president, Jas. B. Thomson; treasurer, David Williams; auditors, Frederick Holmes and Geo. Clay; directors, Thos. Cannon, jr., Geo. Duthie, Jos. Russell, James Crang and Jno. E. Gander.

The President-elect took the chair and acknowledged the honor of his election in suitable terms.

The retiring President, Mr. Cannon, received an unanimous vote of thanks for the energy and ability displayed during his term of office.

The Exchange decided, by an unanimous vote, to present the Treasurer, Mr. David Williams, with a testimonial, marking their esteem and appreciation of his services for the past 21 years, he having during that time been Treasurer of the Association.

After passing votes of thanks to the retiring officers, the meeting adjourned.

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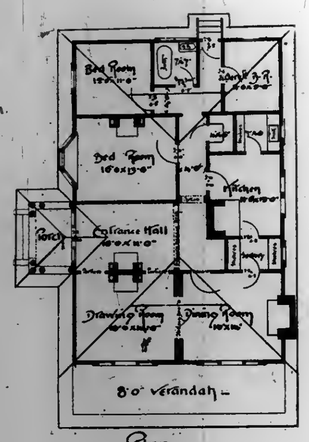
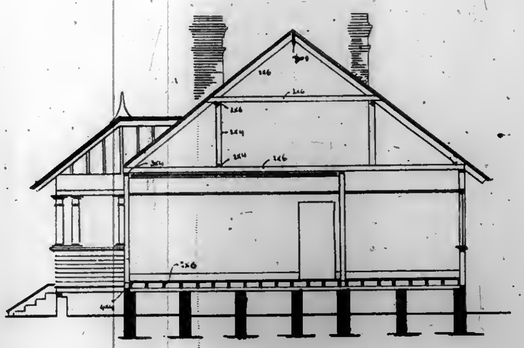


Plan



Section

Elevation to Penrose Road

Elevation to S.W.

Elevation to Jubilee Road

PROPOSED COTTAGE AT ELLERSLIE, NEW ZEALAND.

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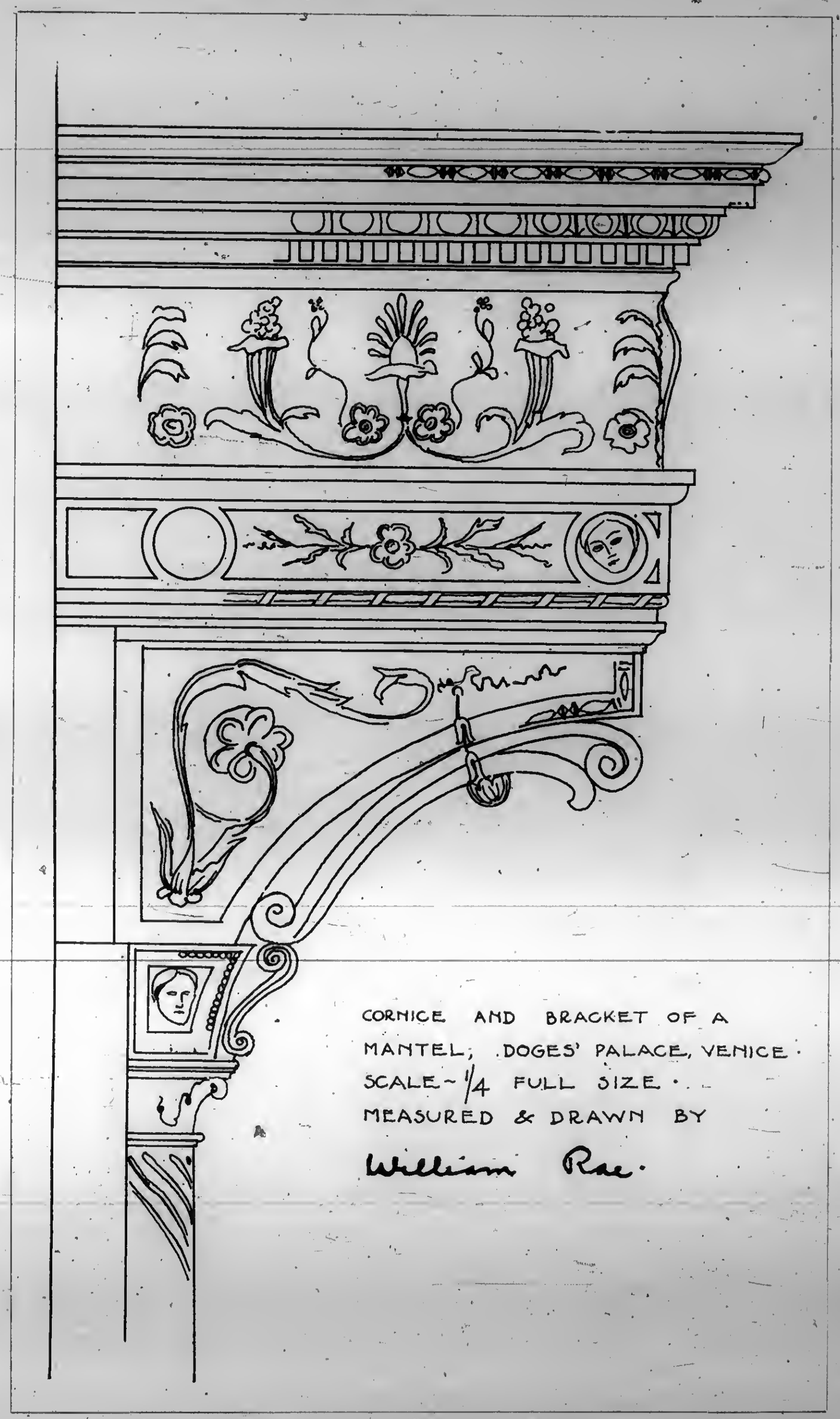

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VOL. XII.—NO. 2. FEBRUARY, 1899 { PRICE 20 CENTS. $2.00 PER YEAR.

—THE—

CANADIAN ARCHITECT AND BUILDER,

A Monthly Journal of Modern Conetructive Methods,

(With a Weekly Iotermediate Edition—The CANADIAN CONTRACT RECORD).

PUBLISHED ON THE THIRD WEDNESDAY IN EACH MONTH IN THE INTEREST OF ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

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Confederation Life Building, - TORONTO, CANADA.

Telephone 2362.

Branch Office: NEW YORK LIFE INSURANCE BUILDING, MONTREAL. Bell Telephone 2299.

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The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to foreign subscribers is $2.50. Subscriptions are payable in advance. The Journal will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrears of subscription paid.

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Some of the Results of Strikes.

OF late the fact has come to be recognized that great strikes of workmen, like that which took place a year or two ago in the engineering trades of Great Britain, are a serious blow to national commerce and prosperity. While British manufactories affected by this strike were closed down because of the unreasonable demands of employees, orders for goods which Great Britain was accustomed to supply were finding their way into the hands of manufacturers of the United States and other countries. Much of this trade has been permanently lost. A similar result followed the great strike of workmen in the Welsh slate quarries. The check on supply caused by this strike induced dealers to look abroad. As a result the value of shipments of slates from the United States to Great Britain has increased from $1,400 in 1893 to $900,000 in 1898. In such cases the workmen must share with the employers the loss resulting from a restricted market. Viewed from this standpoint, it would seem to be the duty of national governments to declare that strikes will in future be regarded as violations of law, and that differences arising between capital and labor must be decided by arbitration.

The O. A. A. Papers.

IN this number are printed the papers presented before the Ontario Association of Architects at the annual convention held recently in Toronto, together with the ensuing discussions. They will repay careful perusal. The papers contain information of much interest and value to architects and others connected with architectural work. This information is further amplified and supplemented by the discussions. It has been truly said that one of the most valuable features of a paper is its ability to provoke discussion. From this standpoint, as well as from many others, the success of the papers presented at this convention must be conceded. Mr. W. J. Hynes treated the subject of plastering as

became one who has been identified with the subject in a practical way for more than a quarter of a century. The nature and possibilities of plastering materials were clearly explained, and suggestions made regarding the methods to be adopted to secure satisfactory results. Such an interchange of thought between the architect who designs and supervises the construction of the building and the skilled contractor who executes the work cannot fail to improve the relationship between the two and elevate the standard of workmanship. It has occurred to us to suggest in connection with future conventions, that if printed copies of the papers to be presented could be placed in the hands of members in advance of the meeting, it would tend to promote well considered discussion.

The T Square Club of Philadelphia.

We have received from this club a volume which serves the double purpose of an exhibition catalogue and an annual review of architectural affairs in Philadelphia. A prominent place is given to a series of letters from eminent architects in the United States, written to answer the question which forms the title at their head: "An Unaffected School of Modern Architecture—will it come?" The T Square Club's view of the present state of affairs is stated in a pathetic extract which is quoted from the address, in French, of their delegate to the International Congress of Architects, held in Brussels in August, 1897. He says (as we translate): "Among our reproductions of Continental architecture, we have already, in Florida, specimens of the Spanish Renaissance as beautiful as any whatever in Spain. In Philadelphia, we have a lofty office building of which the ground and first floors are in the style of Francis the First, as exquisite as any example of that period existing in France. In New York we have a Giralda tower of Seville, and in Boston a library of Sainte-Genevieve in perfection! But, a modern spirit, national, indigeneous, inspired by our own times, which will mark and represent our own times, in place of these servile copies of the monuments of the old world, is still to come, and we await it with impatience." It is remarkable that the letter writers most hopeful of an unaffected style are those two determined stylists, Mr. Louis H. Sullivan and Mr. Ernest Flagg. The latter, whose thoroughly French looking design for the Bronx Park Botanical building appears in the illustrated catalogue of the exhibition, assures us that it is only unacquaintance with the principles that lie beneath the surface that makes people look upon the movement, which derives its origin from France, as an attempt to gallicize American art and a passing fashion. He affirms that it is an evolutionary movement. That may be so, but it does not bear upon it the stamp of such evolution as Mr. Sullivan, who gets at the matter abstractly, finds necessary; that the architect "must absorb into his heart and brain his own country and his own people." The French have a living style. In that truly Renaissance country one enjoys the influence of unity of style which we suppose to have been the architectural charm of cities before the Renaissance. It is no wonder that the ordinary architectural student in Paris is overcome and carries home an impulse which, however fervent for the development of an architectural style in his native country, is much more likely to find the way for it by informing it with his own derived ideas than by the patient absorption into his heart and brain of his own country and his own people. This process is a slow one. It is as when a husbandman, having sown his seed, "has long patience with it." The current business of architecture is only a process of cultivation; that very process of absorbing into the heart and brain the needs of their clients. It was possible for an autocratic French monarch to found an architectural style. The president's veto has not the same power. Architecture in the United States, which is of the people and for the people, will be found in the long run to have been formed by the people. As Professor Ware, with thoroughly national and indigenous expressiveness says, in his excellent letter: "I don't think the T Square Club need worry." If the United States have not a living style in architecture, there is in this production of the T Square Club abundant evidence of a live spirit. The designs are admirable and beautifully rendered. There is plenty of native originality clothed in different styles, but perhaps the most interesting part of the book is the genuine and serious earnestness of the letter press.

Restrictive Legislation.

We regret to observe that a bill has recently been introduced in the Legislature of British Columbia which aims to make illegal any contract for labor entered into with persons in other parts of Canada, as well as with persons in foreign countries before their arrival in that province. The fact that the bill was read a second time without a division would indicate that it is likely to be placed on the statute books of the province. We have no sympathy whatever with this class of legislation, believing it to be a factor calculated to retard rather than advance the welfare of the country as a whole, as well as the particular province to which it applies. The Dominion Parliament was in a sense obliged to pass an alien labor law by reason of the legislation of similar character previously adopted and enforced against Canadians by the government of the United States. We trust, however, that at no distant day the governments of the two countries may reach an understanding by which narrow minded legislation of this sort will be abolished. The proposed law in British Columbia is infinitely more objectionable than the national legislation referred to, inasmuch as it would discriminate between persons residing in different parts of our own Dominion. To our mind, there should be the freest possible intercourse between the people of all the provinces, such intercourse being one of the best means of building up an united nation.

The O. A. A.

In a letter printed elsewhere in this number regarding the Ontario Association of Architects, Mr. Gambier-Bousfield strongly commends the proposal made by Mr. Baker, at the recent convention, that rooms for the use of the members of the Association should be fitted up and conveniently located in the central part of Toronto. From our point of view, this is one of the lesser requirements. The expenses connected with fitting up rooms in a suitable manner, and placing them in charge of an attendant so that they would be available at all times for the use of the members, would amount to a considerable sum. We believe the money which would be required for this purpose could be expended to much better advantage in other directions, as for example in prizes to students. The most important work to which the Association can apply itself would seem to be in the direction of cultivating closer relations between the students and the Association, and in awakening public interest in architecture. The first of these objects could perhaps best be attained by instituting competitions and offering prizes, or, if the necessary funds could be obtained, to institute a travelling studentship. The second object would be greatly assisted if some of the municipalities could be induced to follow the example of the city of Paris in offering yearly prizes for the building of the best design erected during the year.

CODE FOR COMPETITIONS.

The hard times through which the architectural profession has just passed, when even the best established architectural firms have had little work—and even, at times, no work—to do, have been a time of severe trial for the morale of the profession. There have been points in which it has not stood the test. In particular, the small irregular competition has claimed its victims among men who ought to have stood by the profession in the determination not to countenance the competition system except when reasonably used. The great question for architects is how to pursuade the public out of the idea that an architect's sketches cost him nothing, and that it is reasonable to ask an architect to do preliminary work for nothing, merely for the hope of getting work by it. This view may have been reasonable once, when the work of an architect was not what it now is; but it is unreasonable now, and would not stand for a moment if architects were quite clear about it themselves, or were quite clear that they were all agreed about its unreasonableness. As long as the camp is weak or divided it must accept any terms that are offered to it.

What, then, constitutes reasonableness in a competition, and what unreasonableness? It is generally accepted by the profession that under some circumstances a competition is a good thing; that it makes men who are in a position to get the work without competition exert themselves more when they are obliged to compete for it; that it brings forward unknown men who would never otherwise have had a chance; that it is excellent practice for young architects, who can, by entering many competitions for practice, learn ultimately how to succeed and become winners. We are unable to point to evidence in support of any of these propositions. Sir Charles Barry, who founded the type for legislative buildings in Europe, and H. H. Richardson, who founded the type for municipal buildings in America, did so in competition; but these were the great artists of their day; it required no competition to decide upon their selection for such work, and nobody who has read their lives can imagine that the fact of the design being made in competition would make any difference in the enthusiastic energy with which they attacked their work. On the other hand, Mr. Street's Law Courts, won in competition, were probably his worst work; and Mr. Colcutt, the winner of the other great London competition of this generation, the Imperial Institute, has not risen at all to the occasion, but has missed the suggestion of imperial character in an extraordinary manner. Of the unknown men to whom competition has been an opportunity, the greatest example was perhaps Mr. Gribble, the designer of the Brompton Oratory. How his subsequent practice fared or is faring we do not know; his name has not since appeared in any way to attract attention. But his design, which remains, attracts the feet of no pilgrims but the religious; it is as dull as a faithful rendering of the Italian Renaissance can make it. This was the fault of the style, no doubt, more than of the man. The Italian style, which has come to be the style of the Church of Rome, is dull; and, though graceful variants upon it are possible and have been done, they were not done in competition. A competition is not the place for originality which affects the question of taste. The expert arbitrator is but a man; he has a taste of his own, and to expect him to father anything that is strongly marked by the character of the designer, or which in any way savors of a new departure, is to ask him to exhibit qualities incompatible with the very qualities which are the ground of his appointment as arbitrator; that is to say, such marked personal qualities and attainments as are sure to be associated with a marked predeliction of taste and tendency in style, even if he has not, as is most likely, arrived at the settled time of life when a man's ideas are no longer free and unrestrained, but are safely housed under a school of thought. It has been notorious in England that the frequent appointment of Mr. Alfred Waterhouse as arbitrator produced a crop of competition designs which threatened to make the prevailing style of important buildings an imitation of the hard, liney Gothic, which is his peculiar style. Even if the arbitrator has not himself practiced in a style so marked as to indicate a bias of taste, he will not readily take up with another man's taste, and will consider, wisely, that he is best exercising his trust by keeping to safe lines in his recommendation of design. Here, then, is the answer to the argument that competitions are good practice for young architects. They are good practice to enable him to win competitions, but, if he wins, the probability is that the native quality in his style will receive that same chastening which in another branch of art communicates the impersonality of the journalist to his style and distinguishes it from literature.

It is, however, generally agreed by architects that a competition is a good thing under some circumstances. What are these circumstance? It is conceivable that a work that promises to be greater than the known capacity of local designers may justify the institution of a competition that will require them to prove their powers on paper and will also, if they should turn out to he insufficient, give an opportunity to a competent designer from outside to come in and show his sufficiency. It may also happen, when a great public building is in project, that, though there is no doubt about the capability of the profession at home, there is no machinery for making a choice. There is really no logic in favor of competition in this case as far as architecture is concerned, for each designer who enters the competition would, if given the work and opportunity to study it in consultation with the promoters, probably do better work than any would do in competition; but the case is a difficult one to manage in practice without a competition; and, where the work is of sufficient importance to be the prize of a lifetime, or at any rate a great prize, it is perhaps best, though not strictly reasonable, that architects should join with the public in adopting this method of settling the matter. But the public see no reason why the system should stop there, and the proof of the contrary position lies with the profession. They must support no competitions that put the profession in the position of struggling with one another for work, which is an ordinary problem; not large, not new; which is therefore presumably within the power of all; and to compete for which is therefore not to wrestle with the difficulties of a new problem but to struggle with each other for the possession of the work. This kind of struggle is not only undignified but is a most short-sighted policy. It ends in work for all with pay for one, and even he must do more for his pay than he would otherwise need to do. It means the indoctrination of the public with the idea that architects are always ready to do preliminary work for nothing and to try to oust each other.

The best way to settle the question of how far the competition system shall go is to have an absolute set of conditions of competition in which the principle shall be recognized that competitions are not a convenience for architects so much as for the promoters of the competitions, and that for this convenience they must be willing to pay in the shape of a direct fee to the competitors or premiums to the three or four ranked first, besides the cost of employing an expert abitrator of high standing. This expense, which will be only a reasonable consideration for projects of such importance that they appropriately become the subjects of a competition, will choke off effectually all minor schemes of which the object is not so much to procure a better design as to sweat designers.

The Ontario Association of Architects has drawn up such conditions, and, in spite of want of recognition as yet by promoters of competitions and want of unanimity in rigid adherence to the conditions by members of the Association, there is do doubt that the formulation of the idea of a proper competition has been of great service, and conduced to stability of mind in the profession. The neglect of the conditions by members of the Association has been small and, compared with the adherence to them, not important; nor has the experience of those who accepted irregular conditions been such as to encourage them.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.

IMPORTANT TO CONTRACTORS,

A Bill is now before the Quebec Legislature to amend the law relating to contractors, in such a way that the number of years for which a contractor is held responsible for his work shall be reduced, and also that each contractor and sub-contractor shall be held individually responsible, instead of the responsibility being placed entirely upon the general contractors as at present. A deputation, composed of Messrs. Sauvageau, president of the Liberal Contractors' Club, and Messrs. Lemoine, Lamarche, Leland, and Leveille, visited Quebec recently in support of the measure.

A COSTLY BLUNDER.

The civic hospital building in this city is an excellent example of short sighted economy. The building was erected about twelve years ago at a cost of about $75,000. There was no proper foundation put under it, and from this cause the structure is now in a state of decay and declared to be uninhabitable. The Health Committee have recommended that plans be invited for a new building to cost about $35,000. There appears to have been wilful mismanagement in connection with the institution, in view of the fact that some years ago the Legislature voted $10,000 to cover the cost of putting in a proper foundation for the existing buildings, but the money is said to have been appropriated by the Council for other purposes.

PLUMBING REGULATIONS.

A deputation, headed by Mr. J. W. Hughes, the well-known plumber, waited on the Health Committee of the Council recently, to protest against the failure of the sanitary engineer to comply with the provision that the drainage system of all new houses must be inspected and certified before the building can be occupied. The deputation stated that only two hundred out of eight hundred new houses had thus been inspected. The sanitary engineer claimed that he had been unable to obtain lists of the new houses from the building inspector. A sub-committee of the Health Committee was appointed to enquire into and report on the matter, which has an important bearing on the public health.

A MUNICIPAL INVESTIGATION.

A disgraceful condition of affairs is being revealed as the result of enquiries by a committee of the Council appointed to investigate the claims of certain contractors for work done without the sanction of the proper authorities. The committee report that in connection with certain repairs at No. 16 Police Station, a local plumbing firm has presented an account amounting to $511.55, which, at an outside valuation, should not have been more than $297.55. Well known and responsible plumbers, who were called in as experts, stated that they would be prepared to contract for the work at $250. Again, with reference to an account of another local firm amounting to $1,540.11 for installing a hot water heating system, the committee report that the work could be duplicated for $600. The committee state that in these cases no tenders were called for, and the work was ordered without sanction of the Police Committee, and in direct violation of the expressed wish of Council. A similar condition of affairs is shown to exist in connection with work done at No. 12 Police Station, where a charge of $1,987.33 was made for work which the city's experts claim could be duplicated for $1,081.31, this latter figure including a handsome profit. In one of these accounts appears a charge for 117 pounds of solder. The experts declare that not more than 50 pounds could possibly have been required. Labor amounting to almost three months' continuous time for man and helper was charged, which is declared to be out of all proportion to the amount of work accomplished. A stairway consisting of ten treads leading from the main floor to the cellar in No. 15 Police Station is said to have been charged at $2,500. Evidently there is need for a searching investigation into this whole matter, and perhaps also the scope of the enquiry might profitably be enlarged.

FIRE TEST.

A most successful test was made on St. James Street a few days ago of a fire retarding material called Salamanda by The American Fireroofing Company, Boston, under the direct superintendence of their general manager, Mr. Chas. S. Ellis and their agents, Webster Bros. & Parkes, of this city, a large number of the leading architects, fire underwriters and fire department officials being present. The first test was of a house built of ⅞ spruce tongued and grooved and lined inside with No. 3 Salamander and measuring 48 x 40 x 40 in., into which a flue was inserted and a draught door. This was filled with kindling saturated with coal oil and the flames allowed to play directly on the Salamander, a condition not usually associated with ordinary construction. The furnace heat was kept up by fresh supplies of fuel, and 40 minutes elapsed before the fire penetrated to the wood and came through. During the whole of this time the outside of the building was so cool that the bare hand could be comfortably placed on it. The second test was to show the use of the Salmander as a fire retardent for ceilings. A section of ceiling covered with No. 1 Salamander, the lightest made by the Company, and with No. 2, the next grade, was placed over a furnace built with brick and filled with kindling wood saturated with coal oil. The No. 1 stood the test for 13 minutes, when by a regrettable accident it was perforated by the operator and the flames came through. The No. 2 stood for 32 minutes, thus proving conclusively that as a fire retardent it had accomplished its purpose. The third test was of a 3' section of flooring composed of a rough underfloor of ⅞ spruce, on which a layer of No. 2 Salamander was laid and on this a finished floor of ⅞ spruce was nailed in the usual manner. For 60 minutes the fire roared and blazed, being fed with wood saturated with coal oil. During the whole of this time the top floor remained cool enough for the hand to be placed on it without any discomfort. At the expiration of 55 minutes Mr. Carver, of Boston, got on the flooring to show that the tensile strength of the boards was not destroyed and after being exposed to the fierce flames for 60 minutes it still held out, and on being removed the top floor was practically uninjured. This Salamander has been in use in Boston and the Eastern States for the last sixteen years, and in the city of Boston is of such known value that the Insurance companies allow a rebate of 5% off their rates where it is employed, and it is accepted by the Building Committee of the city in lieu of 1 inch of concrete, terra cotta or plaster.

NOTES.

Mr. John Clifford, one of the oldest and most highly respected contractors of this city, passed away a few days ago.

A by-law is now under consideration of the town council of Westmount, which provides that no building shall in future be erected covering more than 60 per cent of the ground area.

The Annual Exhibition of the Royal Canadian Academy is announced to open on the 7th of April, in the gallery of the Art Association. Exhibitors are required to send in their exhibits before the 28th of March.

The recent Conversazione of students of the Faculty of Applied Science of McGill University was held in the McDonald Engineering Building. Refreshments were served and dancing took place in the rooms of the Architectural Department.

A clause in the new City Charter proposes to place an impost of $25 on vehicles used to bring building stone from outside municipalities into the city. The proposal is properly regarded as being too restrictive, and likely to injure rather than benefit the city's interests.

On behalf of the Estate of the late Duncan McIntyre, a peculiar request was recently made to the Finance Committee of the City Council, namely, that the proportion of the taxes for the unexpired term on the building destroyed by fire on Victoria Square be refunded. This is the first instance in which such a claim has been made, and the same has been referred to the city's solicitors.

HAMILTON

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

THE building operations for the year 1898 as reported in the January number of this paper are no doubt quite correct, and for the purpose of comparison with former years are useful, but they do not, nor are they intended to, show the correct expenditure on buildings during the year. For instance, some buildings completed last year had permits taken out in the year before, and as the report is made up from the list of permits issued, these do not appear. In the city of Hamilton the actual amount spent last year probably would amount to half as much again as shown, and therefore 1898 stands as a prosperous year for Hamilton, and a long way ahead of previous years. The outlook for the present year is not exciting; there is nothing very much talked of, but the general idea seems to be that it will be a good year, though the buildings put up will not be of a very important character.

Out of the report of the convention of the Ontario Association of Architects, which the architects in Hamilton have read with more than usual interest this year because the Association has reached a critical condition, there is one good thing reported—good, as savoring of benefit to architects outside Toronto—that is the suggestion to have, at last, some down-town rooms as headquarters. If this is carried out, there will be a possibility of absent members being able to take an interest in the Association. There will be a place to which they can go when in Toronto, where they may chance to see some city members and gather news and information, and return the better for the visit. But it strikes us in Hamilton very forcibly that the Toronto Chapter and its management are a good deal more up-to-date than the Association proper and its board of directors, and that if the Chapter chose it might become an independent body, with very great advantage to the profession. It has been said that the Chapter is the Association. If it is, only let it act as such and have power to act, and shake off the clog which is hanging about its neck and get out of the groove that is the Associations' bane. It will set an example such as is needed, and other Chapters will be formed in other places, and in time a new association of the province will be matured, which from its very nature must be successful.

The Hamilton Builders' Exchange is meeting with extraordinary success and its membership is running up fast. Its rooms are central and open at all times. The architects of the city have been invited to become honorary members and their co-operation is requested to make the Exchange a success in every way. In many ways this honorary membership of the architects may be of assistance to the Exchange, and it will certainly be a convenience to architects as affording them an easy means of reaching contractors.

R. W. GAMBIER-BOUSFIELD.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

An amendment to the Quebec Architects' Act has just passed the legislature, permitting students who had commenced their course of studies in an architect's office previous to the passing of the charter of the P.Q.A.A., as amended by 61 Victoria, chap. 33, to register proof of such studentship with the secretary of the Association within three months from date, and as soon as the period of studentship provided for by the original act, viz., four years, shall have been fulfilled, the said student shall be admitted on passing the examinations provided for admission to practice, the same as if they had duly passed the preliminary examinations before commencing studentship.

At a special meeting of the Council of the Association, held in the rooms of the Association Friday the 27th of January, it was proposed by Mr. E. Maxwell, seconded by Mr. J. S. Archibald, that: "The members of the Province of Quebec Association of Architects learned with heartfelt grief of the death of their esteemed fellow-member, Mr. A. S. Fowler, and that a copy of the present resolution be sent to the family."

ILLUSTRATIONS.

EXTERIOR AND INTERIOR VIEWS OF HOUSE ON BEACON HILL, VICTORIA, B.C.—S. MACLURE, ARCHITECT.

RESIDENCE OF MR. G. T. FULFORD, BROCKVILLE, ONT.—A. W. FULLER, ARCHITECT.

C. A. & B. COMPETITION FOR FOUR CHIMNEYS.—DESIGNS BY "CAZA" (MR. A. CHAPMAN, TORONTO), AWARDED FIRST POSITION; AND BY "PERCIVAL" (MR. ELMER H. RUSSELL, TORONTO), AWARDED SECOND POSITION.

MONTREAL MASTER PLUMBERS' ASSOCIATION.

The annual banquet of the above Association was held on the evening of the 13th inst., in the Balmoral Castle Hotel, the president, Mr. John Watson, presiding. The attendance of members and guests numbered about one hundred. Occupying places of honor at the table were ex-president Harris, representing the National Plumbers' Association; James Simpson, president of the Montreal Builders' Exchange; Joseph Venne, secretary of the Province of Quebec Association of Architects; J. M. Taylor, manager of the Dominion Radiator Company, Toronto; J. O. Thorne, manager of the Metallic Roofing Company, Toronto; Messrs. J. A Lamarche, William Ramsay, J. W. Hughes, E. C. Mount, E. Watson, J. P. O'Leary, Kingsley, Blais, Egan, Powell, Davis, Beaupre, Gibeau, Poole, Giroux, W. Beaupre jr., Stewart, Lessard, Forest, Lamontagne, Warmole, Anill, Thibeault, Goodman, Dickson, Lawrence, Fournier, Gordon, Martin, Tremblay, Date, Saunders, McEntee, Hebert, Lesperance, Prudhomme, Lecours, Woodham, Pettigrew, Walsh and Murray. Letters of regret were read from the president of the National Association, Mr. Wm. Smith, Mayor Prefontaine, J. R. Wilson, representing Thomas Robertson & Company; Thomas J. Tout, representing the National Association of the United States; A. E. McMichael, of the James Robertson Company; Edward Gurney, of the Gurney Foundry Company, and R. J. Lockhart.

After the usual loyal toasts, the president proposed the health of the National Association, which was responded to by Mr. J. W. Harris and M. E. Lesperance. Following the toast to the city of Montreal came speeches from Mr. Lamarche and Mr. Hughes commenting upon the absence of any representative of the Sanitary Committee of the city council, and the failure of the Council to enforce the provisions of the plumbing by-law. The toast "Our Guests" brought suitable replies from Mr. H. McLaren, Mr. John M. Taylor, Joseph Venne, Mr. James Simpson and Mr. Anthes. Suitable reference, was made in connection with the toast to "Absent Friends", to the removal by death of Messrs Charles Jacotal, William Briggs and Fred Horton. Messrs John M. Taylor, P. Carroll and Mr. Wynne responded in a happy manner to the toast to the "Ladies." Messrs Poole, Davis, Fournier and Giroux provided musical entertainment. The success of the Banquet is largely due to the following Committee of Management: J. W. Harris, chairman; E. C. Mount, secretary; P. C. Ogilvie, treasurer; Thos. Moll, J. Sadler, E. Lesperance and J. N. Lariviere.

Mr. Alex. G. Fowler, architect, of Montreal, who died on Thursday, Jan. 26th, aged 75, was one of the first members of the P.Q.A.A., having joined the Association in 1890, and continued a member since. He came to this country during the building of the Victoria bridge, on which he worked as a superintendent until the bridge was opened. Since then he has practised as architect. Among the many buildings which have been erected under his superintendence may be mentioned: The Bell Telephone Building, on St. Catharine street; warehouses for Messrs. Thomas Robertson & Co., on Craig street; for Messrs. Laing & Sons, on Parthenais street; rolling mill and tack factory for Messrs. Peck, Benny & Co.; Zion church, Stanley street church, besides numerous houses and stores scattered over the city.

THE ADVANCEMENT OF PUBLIC TASTE IN ARCHITECTURE.*

A few weeks ago Mr. Langton came to my office and asked for the title of the paper I was to read at the Conference this year. This was the first intimation I had received that a paper was expected from me. However, I believe it is the duty of every member of the society to do his share towards making our annual meeting a success, and although through want of leisure my attempt will not be of the value I would like it to be; I will not withhold it on that account, but give it for what it is worth.

A few days after the interview with Mr. Langton, I have just mentioned, I had the privilege of hearing the Rev. Mr. Shortt lecture to the Toronto Chapter, and he gave me the keynote for my remarks to-day in deploring the state of ignorance existing in the public mind regarding architecture, and suggesting that some method should be found and used—by architects—for its enlightenment. I therefore selected the subject you find on the agenda, "The Advancement of Public Taste in Architecture." I will not, however, promise to stick very closely to my text, as I shall have, perhaps, quite as much to say about the taste of architects themselves.

The architect from the popular point of view is a pictorial artist on a large scale, and of all the arts his is the one most capable of prolonged effort in design, music and poetry coming next. Again the painter will produce pictures to frame and hang on a wall to be seen only by a chosen or limited number; a sculptor will adorn a pedestal with his effort, and only those who seek it find it; music and poetry reach an increased number, but architecture, as a decorative art, is seen by all men at all times, and its silent influence, consciously or unconsciously, affects the minds of the cultured and uncultured.

To speak broadly, there are two faculties displayed in the architectural art—invention and imagination—one constructional and the other asthetic. Invention has to do with the plan and scheme of a building and the relationship of its parts—the artist calling this faculty into play in much the same way as the dramatist creates characters; disposes of their destinies; thinks out the course of events in his story, and sets the scenes. This can all be done by the faculty of invention. Having made the plan and settled the scheme of the structure, its heights and sizes, imagination does the rest, and clothes it with beauty. The construction will, of course, give the motive of the design. Every structural problem will be met and solved before the building is begun, and the architectural design keep pace step by step with the construction, partly modifying it and making it obedient to artistic consideration.

It is of the decorative or imaginative side of the art that I wish to speak—the side which appeals most to the public.

We are all the time seeing and handling things which are beautiful and give us pleasure, or ugly and give us pain. There is nothing, however, to compel us to look at poor pictures or distorted statues; but we cannot escape the ugly buildings which disfigure our streets. Nor can we prevent the baneful influence of such bad buildings on the minds of our children, who, unfortunately, grow familiar with them, and whose tastes will, in all probability, become as corrupt as those of the public to-day.

Considering then that architecture as a decorative art is so transcendently important, is it not astonishing that the bad architecture should have been so long a matter of indifference, or at any rate so long tolerated by the educated public?

The first question I ask therefore, and will endeavor to answer is—"How is the Public Taste to be trained to a better judgment in matters of architecture—a better appreciation of art—and taught to know good architectural design from bad"?

The first essential is, that the public shall be induced to take an interest in architecture, and shall be educated to do so. How is this to be achieved? Not so much by talking as by doing. Not so much by lectures and papers and art criticism as by our actual work in stone and brick and wood. By the quality of the art set before it will the public taste be healthy or unhealthy. It depends, therefore, upon the architects themselves in the greatest measure whether there shall be any advancement in the popular appreciation of our art.

The next essential is closer and more friendly relations between the public and the profession. While I don't agree that the feeling of contempt that is sometimes spoken of exists, except amongst the least thinking class, it is undoubtedly true that there could be a more mutual feeling of respect between them.

It is said that culture only means the development of new relations between ourselves and the world around us—a better understanding of how one thing affects another. This can be made clear perhaps by imagining the way in which every individual would conduct himself towards the rest in a society of the highest possible culture. Courtesy would of course be the rule. Each person would recognize the welfare of the whole as of the utmost importance, and do all in his power to establish it. Nothing would be done in a spirit of selfishness or to draw attention. All would be in sympathy and work in harmony. Under conditions such as these architecture could attain to something like popular appreciation.

My second question is.—"Are we architects going to work in the right way to produce the best of which we are capable, or are we working under hopeless conditions, which must prevent not only any originality, but even tolerably good work?"

Any art is valuable only so long as the artist can be seen in it. The inanimate material which the artist handles, be it a lump of clay, a stretch of canvas, or a heap of stones or bricks, is quickened into life by the artist's communication of his own spirit into the thing. I mean, of course, without pre-meditation, resulting in unconscious expression. We all know of some buildings which have been erected under conditions where the thought of the architect can be read, and his hand traced not only in the general design but in the minutest feature. Such buildings are interesting because they have character, and they owe it to the impress of the architect's personality on his work; and it is only such that can charm and interest the uneducated as well as the educated, and that really deserve the name of architecture.

In the middle ages very much was left to the trained workmen which the architect—or master builder—employed, but they worked under his personal direction, and he was always on the spot to tell them what to do and how to do it; and often himself worked with mallet and chisel on the sculpture which adorned the building.

If this supervision over every part of the building was necessary then, when the architect had under him a skilled body of artizans, trained to the methods of a single school; how much more necessary must it be at the present day when he has no such traditions? They have to work one week in one style and the next in another, and then probably in no style at all. No wonder they are hopelessly at sea when left to themselves. The architect of to-day should, therefore, think no part of his work too small for his attention; everything should be thought out, studied, and the smallest detail designed as carefully as the more important.

It is hardly necessary to say that this has not been done with a large proportion of the buildings in our cities. It is a melancholy fact that much that has been produced is either positively bad or absolutely uninteresting. The buildings that are offensively bad are so from sheer ignorance or contempt for the recognized rules of art, and those that are dull and stupid often are so from the mere mechanical repetition of stock forms and stale ideas, which do duty for thought and save trouble of invention. With others truth has been sacrificed to whim, orders have been painfully caricatured, the details are inappropriate and often out of their proper position—a meaningless combination of forms, freaks and devices, dressed up to look fresh and clever. An uncultured and unappreciative public will call any extravagance fresh and clever until they are taught to know that there is a violation of some law. But the architect who does these things wins a cheap, but doubtful, reputation by pandering to a taste, which if he does not know is bad it is because his taste is no better than their own. He does not fear to blunder in his details, because he knows there is no one to detect them. His safety is in public ignorance.

How essentially different was it when the Greek architects were building. They were encouraged or admonished by the knowledge that they were watched by the trained and cultured eyes of all the Athenian people.

Every citizen was an intelligent critic. No Greek architect could deceive the public with a false proportion or vulgar profile; neither were they deceived by abundance of ornament covering a weak design. Nothing but purity and perfection obtained for the architect a reward. But when their high ideal of art was reached the appreciation and applause were promptly and ungrudgingly given and the reward—riches, honor and fame.

But alas for the architect to-day who is endowed with creative imagination and a keen sense of duty—whose profession is dear to him because of his love for his art. There is little in the condition of public sentiment from which he may draw inspiration and encouragement. He will see bad work pretty generally admired poor work too often approved.

* Paper presented at the eleventh convention of the Ontario Association of Architects.

I now come to the question; "Is not the public taste in Architecture retarded by a want of respect amongst architects for each other, and for which they are responsible more or less? I mean an absence of professional etiquette—the esprit-de-corps of other professions.

Sometime ago I read in a professional journal of an incident which occurred in the States and was singularly like one in which I was personally interested. A brother architect was in the witness box, having been called by the plaintiff to testify in certain points regarding professional charges. On cross-examination the opposing counsel asked—"Is it not very common for architects to offer to submit plans on a venture, hoping that they may be accepted?" The question was objected to by the plaintiff's counsel, but the objection was not sustained by the judge, who remarked that the architectural profession was not like that of doctors or lawyers who never solicited work, but that it was well-known that architects were always glad to compete. The incident shows how little the architect's point of view is appreciated even by the educated portion of the community. But was it not to some extent true? The temptation to get work at any price is a constant one, and while the profession is open to any one, irrespective of ability, it is not strange that good and bad should be lumped together by the public in a single category.

It is true that there is a fundamental difference between the architectural profession and the others mentinned. A lawyer to practice must be a member of the Bar, the physician must have received his degree from the Medical University. The architect, however, is let loose upon the public with or without training. It is not to be expected then that there shall be respect in the public for a profession which does not discriminate amongst its own members, and which is content to let its professional name be used by untrained individuals. Law and medicine have taken measures to protect the public from inefficiency. Architecture has not.

Another element in the want of appreciation of architecture as an art by the public is the established level charge for the services of all; the authoritive schedule of charges sanctioned by the mass of the profession.

The most carefully educated and gifted man gets no more for his services than an ignorant bungler. In other professions, such as music, painting, sculpture, medicine and law, artistic ability is so remunerated that there is always an incentive and opportunity for still further increase, and the public demand for a high artistic standard is established in these professions. It is evident that the value of the work of a true artist is greater than that of the man of small ability. Moreover, the system takes little account of the nature of the design and the amount of brain work required to produce it; the carefully studied and elaborate detail of a first-class residence is of no more value, judged by the existing standard, than the unadorned school house or barn.

A writer in one of the papers has summed up the question in these words—"By the present mode of payment the public first refuses to recognize the difference in the artistic capacity of individuals; second, it refuses to recognize the artistic difference in widely varying services rendered by the same individual; and, third, it refuses to pay the architect in a way that will enable him to give its work his best attention." But the strangest anomaly of all is, that the financial interests of the architect and his client are diametrically opposite. Take the case of a building of the normal value of say $50,000, the commission for which would be $2,500. An architect unskilled and giving little thought to his work would probably spend $60,000 in carrying out the work; for which he would be paid a commission of $3,000. Another architect by thought, labor and diligence, and making various studies and changes in his drawings is enabled to reduce the cost by $5,000. His faithfulness and care are rewarded, not by extra payment for extra study and labor; he receives no payment at all for that, and the original commission is reduced by $250.00, 5% on the amount saved for his client. The better he serves his client the more his commission is reduced.

To recapitulate and conclude, I would say, that before we architects accuse the public of being indifferent we shall do well to look at home and see whether the work we turn out has any real claim to be interesting, and before we claim that they do not know good work from bad, it is our business to ask ourselves whether we have given them a fair chance of seeing what good work is. We shall educate them to be critics by giving them good and faithful work as a standard by which to judge the quality of the whole, and we can depend that every piece of really meritorious work will be an object lesson for the education of the popular taste and public appreciation.

DISCUSSION.

The reading of Mr. Siddall's paper was received with evident manifestations of appreciation, and elicited the following discussion:

Mr. Wickson expressed his very cordial agreement with the sentiments contained in Mr. Siddall's paper. It must be remembered that they could not get any people or body of people to look after them, but in the homely language of an old saying, "every tub must stand on its own bottom," and the same might be said of the Association. However much it might be deplored that the public did not appreciate what is good and what is bad, he did not think anything was to be gained by rating or scolding them for it, but, rather, architects ought to make that which they themselves knew to be good, and endeavor to educate the public unconsciously into liking it. Apropos of Mr. Siddall's reference to conscientious work, he thought if architects would cultivate the habit of considering what their brother architects would think of their work rather than the view taken of it by the public, it would result in the production of more meritorious and truly artistic designs. He thought that architects would be respected more by those outside of their profession if they respected themselves and each other more. He deplored the conditions which resulted in two architects being found in a court of justice, one swearing to a state of facts diametrically opposed to that advanced by the other, and he thought there ought to be some arrangement possible that would obviate that scandal, and result in the evidence of experts agreeing at least to a reasonable degree. Referring to what had been remarked by Mr. Siddall, that under the present system of remuneration when a good man by his skill and care kept down the price of work being executed for a client it resulted in his receiving less for his services than the careless man obtained, he thought it was well to remember that the architect who earned a reputation for protecting the interests of his clients in that way would not fail to ultimately reap his reward in the shape of an enlarged clientele.

Mr. Baker thought that to discover the secret of really good architecture one had to revert to the earlier days of the art and see how matters stood then. He was led to understand from what he had read that in those times the architects were the most learned and cultivated men in the land, numbering among them many bishops and other high clerical dignitaries thoroughly in touch with their "public"; and, as Mr. Siddall had said, these men erected their buildings not from drawings which were sent out of their hands, but they practically lived on the buildings and watched their creation step by step, and in that way every little detail was fittingly carried out. Mr. Dick had yesterday put the whole thing in a nut-shell, when he said that the architects of to-day in Canada, in addition to supervising their work, had to be not only their own superintendents, but in many cases foremen of the different trades. So long as that condition existed it would be difficult to achieve the high standard of work which had been reached by English architects, who always appointed a clerk of works, who had only one building at a time to superintend. Then to-day the question of cost was one of the first considerations, something which did not enter so much into the calculations of the architects in the earlier times, when no contracts were let, and the work was paid for as it proceeded. In that connection, he thought the English method of having

the quantities taken from the plans and specifications by skilled "quantity surveyors," paid by theowner, and the contractor making his estimate on these quantities, instead of each contractor taking off his own quantities and making his estimate thereon, was a very good one, which must result in the advancement of good architecture, and he would like to see the system introduced in this country. It had been shown by Mr. Siddall that the man who worked hardest in the monetary interest of his client was the one who received the least remuneration; that was the first logical argument he had ever heard adduced against the percentage system. He understood it was now the case in England that a number of the leading architects were receiving stated sums in payment for their services in carrying out buildings, instead of working on a percentage commission. He agreed with Mr. Darling that every man had a right to set his own scale of charges for services rendered, and, as a rule, he thought the public were pretty well satisfied that architects were not over paid. He had great pleasure in moving a vote of thanks to Mr. Siddall for his excellent paper,

Mr. Burke said one could not take a walk through the newer parts of Toronto without being impressed by the large number of houses of a class designed simply to catch the public eye. He thought it might be said that three-quarters of the houses recently put up were simply houses copied from others of the same type. In his own practice he was continually meeting with people who admired this or that house because of some feature not at all in accord with true architecture, but which for some inexplicable reason seemed to gratify a certain fancy of the public. You would find perhaps windows of half a dozen different styles in one front, aud features introduced without any logical sequence at all, simply to gratify and catch the taste of clients of that class. This all made it very difficult for an architect who desired to design in a simple, logical and dignified form to obtain work. With regard to the question of detail, that was a very serious problem for the architect of to-day. As Mr. Dick had remarked, so much attendance had to be given to superintendence, that without burning the midnight oil, there was little time in which to cultivate design. Referring to the question of fees, he doubted whether under the existing conditions, any system more satisfactory than the present system of fees could be devised. There was one phase of this question, however, which he thought presented difficulty. In one case a man might have an easy going client, who made no bargain about fees, but left the architect to charge whatever he thought was the value of his services. In another case the client might be a hard bargainer, one who would say, "Well, if you won't do it at this rate I can get someone who will." Now, was it right to charge one man 5% for the same class of work which under pressure like that you would accept 4% for from another man, simply because one was a hard bargain driver and the other a man content to let it go in the usual way? Yet an architect who was conscientious was driven to accept uniformly a less remuneration than his services were really worth, or else, on the other hand, ran the risk of losing clients and work.

The President noted that nearly every speaker had touched upon the main principle in all good design, the correct solving of the problem presented, and that problem included every consideration that arose in each case, the matter of good and bad taste, the requirements of the client, the money consideration, the nature of the site, and everything else connected with the proposed building. He thought too much stress could not be laid on the necessity of approaching work with that thought in mind.

The vote of thanks to Mr. Siddall, having been seconded by Mr. Wickson, was then carried.

Mr. Siddall, in acknowledging the thanks tendered him, said there were one or two points that had arisen during the discussion of which he would like to say a word or two. It had been remarked by Mr. Wickson that the careful conscientious architect would get his reward by the increased patronage that would accrue to him. It was doubtful if that was an unmixed blessing, for he thought one cause of trouble was that architects undertook too much work, more than they were faithfully able to carry out in the way he thought it should be carried out. If they could undertake less work, getting for it proper remuneration, it would go a long way towards obviating many of the existing drawbacks, such as the impossibility of designing details in all the work. He thought a great deal of the working out of the details should be done on the building, a plan that was followed by some of the best English architects and might with benefit be adopted here, because there one had the whole thing before him, and could form more correct ideas as to proportion.

Mr. Burke pointed out what he considered the impracticability of the course suggested by Mr. Siddall. An architect here, if he desired to keep abreast of the times, must have all his working plans and details matured before the foundation of the building was finished, and the details of his interior work in the hands of the carpenter before the roof was on.

ONTARIO ASSOCIATION OF ARCHITECTS.

THE examinations of the Association will begin on the 13th of March next. Students wishing to enter for the examinations should send in their names to the Registrar.

The various propositions made in convention for the improvement of the Association are being considered by the consulting committee appointed at the convention. The committee has had two meetings with the Toronto members of the Council, and there is no doubt that some of the propositions that are brought before it—if not all—will be found feasible. It will be necessary to submit the result of these deliberations to a full meeting of the Council, and finally to the next convention; then, as the way is already prepared for them by a notice of motion, they may become law at once.

The Toronto Chapter met on Monday evening, the 13th, to hear Mr. W. L. Symons give his paper on "New Problems in Architecture," which circumstances prevented him from giving at the convention. The paper dealt chiefly with the new method of practising made necessary by the diversity of the operations required by modern architecture, and was a strong and practical argument in favor of the employment by architects of specialists to work out the details of important construction, and even of heating, sanitation, etc., when these details are so extensive as to engross the attention of the architect to the exclusion of architecture proper. Mr. Symons argued that if a specialist can do any portion of the work better than the architect, it is the architect's duty to his clients to employ him; and he pointed out that not only is it a gain to the architect himself to have these so-called "practical" parts of the work well done, but in setting his mind free to attend to design it enables him to devote himself to that by which his practice stands or falls; for it is always to be observed that when an architect begins to neglect his design by giving his own attention chiefly to practical affairs, his practice begins to fall off.

The audience for this paper consisted of Messrs. Grant Helliwell, C. H. C. Wright, W. R. Gregg, W. A. Langton, F. S. Baker, G. R. Harper and J. Wilson Gray.

CORRESPONDENCE

THE ONTARIO ASSOCIATION OF ARCHITECTS.

Spectator Bldg., Hamilton, Ont., Feb. 6, 1899.

To the Editor of the CANADIAN ARCHITECT AND BUILDER.

SIR,—I have read with interest the report of the meeting of the Ontario Association of Architects in January. The President referred to those "objectors who complain that the Council is not active enough and that the Association fails to give them a direct return for the fees paid, or who are continually crying to the Council to do something—they never say what—to make the Association more interesting to its members." I am not one of these, because I am not a member. But as an outsider, a former member, and one who would come under the President's description of "objectors" if I was a member now, I should like to say a few things. You may remember that the President asked me to attend the convention and read a paper making a suggestion as to how the Association could be made of use to architects outside Toronto. The Registrar, in forwarding the President's invitation, took occasion to "warn me it would be of little use my coming unless I had a scheme prepared, cut and dried." My reply was that I considered it the duty of the Council to prepare such a scheme, and that it was not possible for one man to do the duty of the Board. Please understand my position. If the Ontario Association could be made one particle of use to architects of Ontario, I would gladly apply to be re-admitted to membership, and I should be glad to do all I could to further the Association's objects in my part of the province. But I maintain the Council has followed a policy that, instead of attracting architects to the Association, has driven them away. I do not want to hurt anyone's feelings, but I am going to be a little personal, because this matter is not a private one, but one that concerns every architect in the province, and that there are many who think somewhat in the same way as I do is shown by the fact that, as the President said, the present register of the Association contains the names of only two-thirds of the architects of Ontario. What has the retiring President, Mr. Townsend, done during the whole year of his presidency? Has he succeeded in bringing the Association and the public an inch nearer together? Does he feel that his term of office has redounded one wit to the good of the Association or the public? Does Mr. Langton, as Registrar, think that he is doing anything to draw outside members into closer communion with the Toronto members, or even to help Toronto members themselves, when he feels as he expressed himself at the convention, that he prefers his fireside and his book to taking any interest in furthering the objects of the Toronto Chapter by attending the meetings? And with all due respect to a gentleman of Mr. Belcher's years and professional experience, what possible good can he do the Association as President? Here is a fine opportunity for Mr. Wickson, as Vice-President, with the President non-resident in Toronto. Active work ought to fall to him, and upon him should devolve the initiative of many a good thing. But will he prove himself equal to the occasion? Will he initiate anything, or will he follow in the footsteps of his many predecessors, and be a figure-head only?

Mr. Baker made a suggestion which is by no means new, but which ought to be carried out and should have been years ago, namely, that suitable headquarters for the Association should be provided. Why have there been no rooms where papers were on file, where members might drop in, where country members could come in contact with city members, where the public could find the Association and have proof that it existed? Why? Because the Councils have been behind the times, because there was no life in them, and active notions of any sort were always sneered at and discouraged. Mr. Baker makes the only practical suggestion of any real value, and then the committee appointed to carry out or consider the matter is formed without his name being on the list. No wonder, then, the Association is a failure; no wonder the Treasurer's report is discouraging; no wonder that outside members take no interest, and young architects starting for themselves do not care for membership.

Mr. Townsend, as outgoing President, said in his address that the Council had formulated building laws "which if adopted and enforced," etc. But that is just it; they are not adopted, and municipalities do not take the trouble to adopt the Association's by-laws, because they do not know anything about the Association itself.

"Conventions and exhibitions and public lectures;" how did these educate the public? The public knew hardly anything about them, and the lectures when delivered by architects were so utterly dry that the few "public" who attended one might well be excused from attending a second. Then, when an outsider is brought in to give a lecture on architecture, his theories do not agree with facts, and the public get taught incorrect notions of architecture. As to "esprit de corps," its a fine idea, and in a few cases exists, but as we know from every-day facts how members of the O.A.A. backbite each another, and exhibit such childish jealousy of each other, to say nothing of the manner in which they are continually wire-pulling and trying to cut each other out of a "job," the less said about "good fellowship" the better, because it is nothing but rank hypocrisy. Architects do not care a fig for the "advancement of the art they love or ought to love"; they are too human and have pockets to fill, and all they care about now-a-days is to fill their own pockets. I do not say that is a good thing—it is a pity—but it is a fact. I think the sooner the Association has an honorary Registrar the better, as suggested as a necessity by the Treasurer, because the Registrar's office is one of great power for good to the whole profession, and a man who fills the office for his "love" of the profession and his desire to advance its interest will do so more earnestly and effectually than one who is paid. Have a paid Secretary if the work requires it, but have an honorary Registrar.

Yours truly,

R. W. GAMBIER-BOUSFIELD.

Canada Life Bldg., Toronto, Feb. 10th, 1899.

Editor CANADIAN ARCHITECT AND BUILDER.

DEAR SIR,—I am obliged to you for sending me Mr. Bousfield's letter to look at. The best answer I can make to it is to repeat what, in my letter inviting him to attend the convention and read a paper upon the subject of how to make the Association of value to its members, I said before: "I may as well warn you that it will be only by working out a scheme practically that you can do much good. There are no new suggestions in your letter (letter to the CANADIAN ARCHITECT AND BUILDER for December). Everything mentioned has been already acted upon; and, unless you are prepared to show how any proposal you may make is to be worked so as to bring success, you may be contronted with the statement that it has been already tried. In other words, if you suggest what has been tried before, you may still make a valuable suggestion if you can show a systematic way of going to work that will give hope of making more of it than has been made before."

There is an instance of this now. The question of whether the Association should have rooms of its own or not is a live question, but it turns upon the question of evidence as to whether a room will be really of such use to members that they will find it worth while to pay for it. If Mr. Bousfield wishes to speak for outsiders and will get any names of outsiders who would resume membership of the Association, so as to share the advantage of such a room and the attendant cost, he will approach the question in an effective manner.

I perhaps ought to point out what Mr. Bousfield could not know, as the order in which the proceedings took place is reversed in the published report: That Mr. Baker was not appointed on the committee connected with his motion because he had just been elected a member of the Council, and in that capacity would meet the committee which was appointed to "confer with the Council."

Yours truly,

W. A. LANGTON.

PLASTERING, PLAIN AND ORNAMENTAL.

By W. J. Hynes.

Gentlemen :—I am before you to talk on plastering, plain and ornamental. A local experience is all that I can speak from. I was born in this city and have followed my calling for 27 years—long enough to qualify me as an authority on the subject. I am not very diffident as to my knowledge, but I have my doubts as to whether I can place it before you properly, and I am most anxious to interest you in a much neglected art.

I propose making a short review of materials before taking up their use and application. The first is Lath.—My experience calls for great care in the selection of this material. A soft white pine, that will stay where it is nailed, is my preference. It should be seasoned, but not necessarily dry, and have a straight grain. When a dry lath is coated with mortar it must necessarily swell, and when it dries again it must shrink. A lath which is not thoroughly dry will not have so much shrinkage and will have a more secure key. Wire lath nails 1⅛" long are what we generally use; there is no advantage in having them heavy, but they must have a good flatted head. Metal lath is now offered in many forms; I do not intend to indicate my preference; there are several good articles on the market. I will merely ask you to examine samples in the full sheet—note the stiffening; they should be rigid every way. Satisfy yourself as to the key and and effect upon it of a settlement or shrinkage in the building, and always have it painted or galvanized. Wire lath is good—it is almost all key. It is more expensive to buy, apply and cover than metal lath, and for that reason is not so much used.

Lime mortar is in general use, and most of our specifications for the preparation are taken from English authorities. I will not attempt to give you the theory of lime—most of you had a full explanation of that in your student days. I think that the Architectural Chair of our University might devote some attention to the examination of the various limes offered in our market with the proper proportions and description of sand they will carry. Until such time as this is done, I would advise you to have your work done by contractors in whom you have confidence. Good work can be done with lime, but it is a very variable article; we are well served in Toronto, but some very bad limes are used in the country. Our mortars are mostly made from grey lime; they are cool in working and should be given ample time to thoroughly slack before mixing with sand. Haste upon the part of the mortar man or a tendency to stir up the mass before it has slacked, will most likely result in lime pitting on the finished wall. In some lime or in fact in all lime, if not properly burned, there is great danger from this. There seems to be an underburnt core which very often disfigures good work. As this generally occurs in winter work the cause is more often with the mortar man than with the lime itself, but be as careful as you may it will occur sometimes.

Lime putty is made from white lime, generally called fat or rich lime. It is run in large vats and should stand a month or more before using. This material has no strength in itself and requires to be mixed with sand or gauged with calcined plaster before use.

Hair is necessary for mortar for use on lath work, and a smaller quantity is of decided advantage to the straightening or browning coats. It should be clean, well saved, long, winter cattle hair. Hemp, sisal, palmetto fiber, and many substitutes are used instead of hair in other places, but are not offered on our market.

Calcined plaster, the most useful of our materials, is used for many purposes. By mixing one-fifth to bulk with lime putty we obtain the compound for what we call "hard finish." A greater quantity mixed with the same putty allows us to form run mouldings. Where the thickness of moulding is too great to use putty and plaster, the work is cored out with mortar gauged with plaster. Quick work can be done by gauging the first coat of mortar in plastering to admit of finishing at once.

Its greatest use is in moulding and casting decorated ornaments, staff and fibrous plaster work. The property it possesses of swelling when setting serves to give us most faithful and accurate copies from any original, hence its extensive use in fine art. In addition to this, calcined plaster forms the basis of nearly all the patent or prepared plasters. By the addition of retarding and hardening compounds its setting is delayed sufficiently to allow of mechanical manipulation, while its ultimate strength gives a much stronger wall at once than can be obtained by using lime. My own conviction is that in time most all our work will be done in those materials or with machine made mortars whose proportions are fixed and accurate. Plaster is also the base for the white cements, such as Keene's, Parian, Martin's and others. Just here I would say that principally through your own fault, gentlemen, I do not consider myself an authority upon those cements, and shall not dwell further upon this than just to say they are perfect goods, make perfect work and deserve much more attention than you have given them.

Before speaking of lathing I have something to say about the necessary preparation therefor. The genius who first conceived the idea of making the plasterer responsible for the carpenter work by a clause in the specifications calling on him to examine all studding, strapping, &c., before lathing, and if not found correct to stop and report same to the architect, could not have grasped all the facts: 1st, the carpenter is a bad man for the plasterer to fall out with; 2nd, tale bearing is not congenial work; 3rd, lathing is done at the rate of 2 or 3 cents per yard by a boss lather who is hustling a gang to make his work pay. It is easier and cheaper for him to get over the carpenter's bad work than to lose time and report it. If the angles are not solidly nailed the lather is not likely to do it; if a line of joisting demands the cutting of 8 or 10 inches off the lath for a long distance, the chances are the lather will find a convenient board or scantling, place it where the joists or stud should have been, and make his nailing to this loose piece, trusting to the lath nails to hold it until plastered. This is bad—very bad—but who is to blame? I say the architect is. If joisting and studding are not sized and one bulges below or forward of the others, it is easier to add on a few laths and give the wall or ceiling a graceful but incurrable curve than to wait on a carpenter to trim it. Kindly examine the carpenter work yourself; don't dodge or depute your responsibility.

Have your lath laid in bays with breaks every 15 inches. Have a ⅜ key on walls and slightly larger on ceilings. Don't allow carpenter work to force the use of vertical lath. Have heavy timbers counter lathed. Don't allow laths to break over door post; slamming that door will break the plaster. Use plenty of bridging on joisting and studding. Strap all ceilings. Have false arches and beams made very rigid with as little timber in their make as possible. See that all junctions of wood and brick work are nailed very solid, and have them covered with metal lath; 16 inch centres is the greatest distance that should be allowed for 1⅜ lath; it is too great for 1 inch lath; they should have 12 inch centres. Try and have your work so correctly planed that the lather can make money; he will give you a good job with pleasure. The only way I know to do this is to have that greatest of all boons on a building, a good carpenter—the only way to get one is to give him a good paying price. He wants to live, too.

Now before the mortar is applied, before even the lathing is started, any ordinary good job should be well prepared by grounds. This is generally done badly, and the results are always to be seen before completion. The entire details of the interior finish should be made before this work is done; it's the only way if you want it correct.

Perhaps I have been too lengthy on this particular question, but I wish to impress upon you that good plastering demands solid, firm and well prepared work to secure it. I am not here to tell you what bad plastering requires, but your chances of holding up bad work are good if work is prepared properly.

If, as I have suggested, the details have been prepared, the grounds fixed, a very definite idea will have been formed of the character of each portion of your building and you can definitely specify the proper finish. Two coat work is most general. It is sufficient for ordinary rooms to execute this work as so often specified—plumb, true and straight is not possible. One coat of mortar only can be finished with that wonderful tool we call a "darby;" it is a great implement for effecting a general levelling up, but don't try a straightedge on work left after it.

Hard white finish is made by gauging lime putty with calcined plaster and trowelling it to a finish before it sets. Perhaps some of you have discovered that hard white finish is misnamed—the hardest lime finish is never white—the strength of this coat is improved by the addition of sand.

Now if your work is to be decorated, if expensive paintings and paper are to be applied to it, you should hesitate before placing them upon work that is neither straight nor strong. Three coat work admits of proper straightening. It will also on ceilings generally guard against the danger of seeing each joist and lath some time after work is finished, and further it gives you an opportunity to finish it as your work demands.

Trowelled Stucco.—The best hard finish is made with lime putty and sand, thoroughly tempered and applied to the straightened coat of mortar. It is first laid true, then very thoroughly water floated, or scoured, and finally trowelled and retrowelled until a polish is secured. It is then dry brushed. This work is smooth and true enough for any painting, hard and firm enough for any paper.

Bastard stucco is done in very much the same manner, but the trowelling only progresses far enough to secure a partially smooth wall. As its name implies it is neither trowelled work nor rough stucco. This makes strong work, admirably adapted for either paint or paper.

Rough stucco, used on exteriors, hallways, churches, and in public and semi-public places, is generally executed in two coats—the first being heavily scoured, the second brought to a finish in one operation. Three coat work admits of a better stucco; the work being straightened in the second coat admits of a great variety in texture of the finished stucco. You may have it left very rough with all the indications of floating tool—with the graceful sweeping lines and curves, this work can be made very effective—or you can have it finished of a granular matt surface of great, uniformity and evenness. Vaults, domes, intersecting groins—especially where finished without mouldings—are best done in this work.

In speaking of stucco I use the term as generally applied by the trade to the rough-floated work I have been speaking of. I would like to see the use of this word in specifications somewhat limited. In its literary sense there would seem to be no limit.

Toronto has some fairly good samples of ornamental plastering; in what slight travelling I have done in the United States I found nothing near so good. Osgoode Hall, the first done, is still the greatest, executed under Cumberland & Storm, architects, by my father and uncle in the '50s. The Custom House, done in 1875 by the same firm, shows clearly what different results can be obtained from the same artist or machanics by different designers. However, as government work requires the man who gets it to have a "pull," we should not look for architectural excellence in that quarter.

The legislative chamber in our Ontario Parliament Buildings furnishes an example of modelling done right on the work. The Romanesque character of the work was admirably adapted to this method of handling, and Mr. Johnston, who did this work, deserves credit for the result.

In the Board room of the Imperial Bank there is a fine ceiling of strap ornament also modelled direct upon the work.

The Bank of Montreal, Dominion and Imperial Banks are good examples for plaster work. Most of these buildings have been plastered on metal lath; the mouldings also were on metal lath, and all enrichments being cast and bedded into their places afterwards. Some of our later work—especially the chapel of Our Lady of Lorretto, Temple building, dining-room in Hon. G. A. Cox's residence, ceiling of Nasmith's Restaurant and others, are samples of staff work. This work is carefully modelled, moulded and cast in fibrous plaster, and fixed in position by nailing.

In spite of the many fine examples, I claim your profession has neglected our art, and progress has been very slow. I am now working in Toronto 27 years. I do not now, as formerly, carry a few stock cornices of each architect's design; I am not ordered to run same moulding, use same centres, brackets, and such stock work on each successive job.

Your opportunities to individualize you work lie in the ordinary every-day problems you handle. How much better to give each client something of his own instead of furnishing him with a duplicate of a previous work. Why not forestall the modern decorator and make him follow lines dictated by architectural study, than have him run riot with color in an attempt to decorate an impossible interior.

My earliest recollections of cornices are of a huge cove following closely to the angle of the room; below was a heavy mass of mouldings—their size, no doubt, the result of a static computation on the amount of dust it could carry. This was completed by a similar collection of heavy mouldings on the ceiling. Such a room was not complete without a centre flower, which must, of course, conform to the size and shape of the room. We had to fix with plaster huge ornaments five and six feet oval and circle as was thought necessary, and from 2" to 12" deep. These had beautiful strong undercut ornaments that held more dust that was impossible of extraction. Well, some of these are still up; some have caused manslaughter; many have helped the sale of china and furniture. Time taught us this was not safe, and the next result was an attempt, under the sacred name of good Queen Anne, to get as many members as possible into a given space and avoid the pitfall of our predecessors, by making this as light as possible. With this came a revival of the run centre, and we were forced to form mouldings around gas-pipes that were fearfully and wonderfully designed. From my vantage point before you I can say many things that I would not like to say to you individually; the cap might fit. Those of you who caused these things to be done were, no doubt, like myself when working at this, under the impression that we were executing architectural work instead of perpetuating architectural monstrosities. What I want to impress upon you to-day is that you are the teachers, the leaders—even the Jerry builder looks to you for pointers.

You all know the method of run work. I will not describe it, but would request that you study the limitations of the material and have brackets provided for your mouldings and not take risk of the work falling by overweight; the best work should not average one inch thick.

The World's Fair at Chicago first placed before the profession the merits and demerits of Staff; the name was new—the daring use of the material new, but the use of fibre with plaster was familiar to European mechanics for years previous to this. As used in the White City, it was exposed to the elements; it was hastily nailed in position by any workman the contractor could secure; then hastily painted. Lines were any way; intersections not exact or true; the general effect was required, and it was successfully secured. Perhaps this very unevenness that I mention helped the effect; they certainly bore a remote resemblance to the varying and inexact lines of the early artist plasterer, whose work was all by hand in position, and carried with it that peculiar and indescribable effect that hand-work always does.

This staff is now before you as a commercial substitute for the run mouldings. The cost is nearly alike, unless when great quantity and richness favor the staff, or a small quantity and comparative plainness help the older method.

For staff work you will have to think out your design—studying the material—the best effects are plastic, the true nature of the material. You need not have a smooth, moulding; by combing and corrugating we vary the texture so that even a plain moulding may display its design with a side-light without breaks. Our methods are similiar to the Terra Cotta. I would like you all to see what I mean by this. If you will visit the chapel of Lorretto, Wellington square, you will see a rough plastic treatment.

From your detail the model is finished complete in the shop. Upon approval it is cast in plaster. While this mass is setting, a large amount of fibre or serim cloth is embedded into it; this enables us to make large and strong casts. A frieze which I made for the Conservatory of Music, here, was 12′ x 2′ 6″ and cast in one piece.

Gentlemen, I fear my subject is too much for me. I would sooner do the work than talk about it. What I would like would be to give each and every one of you a sample from your own details. I believe that this method of work is here to stay. It is light and strong, comparatively cheap, and will stay where fixed. The cost of our substitute for the sheet metal ceilings is not much greater than that very undesirable article; of course it has the drawback of repetition, but under good design this may be made an advantage. I shall leave to your professional training and knowledge the matter of design; my object will be attained if I can make you regret the wasted opportunities of the past, and inspire an anxiety in you to do better in the future.

Discussion.

Mr. Paull, in proposing a vote of thanks to Mr. Hynes, paid a very high compliment to that gentleman's skill and business integrity. He felt sure that so practical a paper could not but be of the greatest benefit to those who had the privilege of hearing it.

Mr. Siddall seconded Mr. Paull's motion, and in doing so remarked that in England much better plastering work was done than in Canada, and he believed the work in Canada was superior to that done in the United States. In England it was the exception to find any less than three-coat work, the specification of even small houses calling for three coats of plaster, floated and set, and he thought that was the only method of getting straight work. In the old country he had observed that they used a tool which he had not seen used

* Paper presented at the Eleventh Convention of the Ontario Association of Architects.

here very much—the long straight edge—and all work there was made perfectly true.

The following discussion then ensued :

Mr. Burke : I have been told that a great many of the buildings in the United States which have been plastered on metallic lath have been developing serious defects, in some cases it having been found that the metallic lath had almost disappeared. I suppose that was owing to their not being galvanized.

Mr. Siddall : I had a little experience of that in the Confederation Life building. We had occasion to take down a partition, even before the building was completed, and, although the lath had been painted, it was half eaten away.

Mr. Burke : Have you had any experience in that respect, Mr. Hynes?

Mr. Hynes : I cannot say that I have, personally. I have never seen any metallic lath that were destroyed by oxidation or rust, but I know that where the lath is not completely covered with mortar it will rust. If the iron or steel is thoroughly embedded and covered with mortar, I do not think there is any danger whatever, but where the slightest particle of the metal is exposed it is likely to be affected, and that is why I say it should always be either galvanized or painted.

Mr. Siddall: I quite agree with Mr. Hynes that if the metallic lath were completely embedded with mortar no rusting would take place. I think it is the exposed part at the back that rusts.

Mr. Hynes : A thorough covering of lime mortar is a preventative of rust, but the reverse is the case with all patent plasters having calcined plaster or gypsum as their basis ; this material has a very great and immediate tendency to rust. I should think the cases cited by Mr. Burke were likely caused by their use. English white cements—as Keene's, Parian, Martin's—have a still greater tendency to cause rust, even destroying the tools used by the mechanics when working them. A knowledge of this fact is sufficient, as it is easy to guard against trouble from this source.

Mr. Wickson : Mr. Hynes did not refer in his paper, I think, to any of the patent plasters that have been on the market lately. There is the Rockwall plaster, Paristone, and others ; I wonder if he has had any experience of them, and if it has been satisfactory.

Mr. Hynes : My experience has been principally with Adamant. This was the first of the patent plasters. It originated in Syracuse in a patent for hardening plaster. The inventor became associated with business men, who changed his fluid chemical into a dry powder, and made a plaster furnished complete and ready for use by the addition of water. They did not make much out of selling the plaster, but obtained large sums for State rights—Illinois selling for $35,000, Pennsylvania for $17,000. Of course, in addition to the chemical compounds, to everyone whom they sold to they gave a formula of how to make the plaster. The result was that each of these parties found difficulties in preparing the mixture, and after a series of experiments each became an expert, and then called his mixture something else—"Rock Wall," or anything he had a mind to, but they are all composed of the same compound with the exception of the Acme, Agatite and the Royal cement. These I have never been able to get analyzed, and I would suggest that the authorities of the School of Practical Science make an analysis of them. They seem to be a kind of brownish earth, and it is claimed that they are calcined. They make very hard, durable work. Those on the market here to-day are principally Rock Wall, which is good. It is made by the Albert Mfg. Co., of Hillsborough, N. B., who also supply most all the calcined plaster used in our market. "Paristone" is made in Paris, Ont., by the Alabastine Company, from the local gypsum found down on the Grand river. The Grand river gypsum is good and plentiful, but is very little manufactured. I do not know of a bad patent plaster—it does not pay any one to make one that is bad.

Mr. Dick : I am sure Mr. Hynes has given us a very valuable paper. There is one point on which, perhaps, he can give us a little information, and that is about mixing the mortar applied to walls and so on, as to the time it should be allowed to stand before being applied to walls, with special reference to the limes we have in this country.

Mr. Hynes: Our limes are very slow, cool limes, and when they are first made up all limes are watery; and if you place them on the wall at once the lime has no binding, and the key falls off. It would never do to put fresh mortar on walls ; it is radically wrong, though one is sometimes forced by circumstances to do it. The idea of leaving it for a period of weeks or months is equally absurd. I think our mortar, after standing one week in ordinary weather, is sufficiently aged for all practical purposes. The greatest danger in connection with plaster is in trying to rush it through, and drying it too quickly. You see, you have only three-eighths of mortar on a lath wall, and if you dry it in a few hours there cannot possibly be any strength in it, the best lime cannot have any chance to strengthen properly. I am not an advocate of taking an unreasonable time, but I think that attention should be paid to the circumstances. The weather in summer that dries mortar in a few hours will always leave you a weak and pulverent mortar.

Mr. Wickson: Nearly all the text books say that lime when slacked ought to show a considerable amount of agitation, bubbling and hissing and so on. Now, I have noticed that a good many of the limes used here are quite unemotional when the water is put on. Will Mr. Hynes tell us if that is any indication that they are not good?

Mr. Hynes : That is a question that covers a good deal of ground. Limes are divided into different kinds. There are the pure limes, composed of almost all lime, and when they are put in water they go off like a shot ; in fact, I have had limes placed in a lime box under a tree that burnt all the leaves off the tree. That was a pure, fat lime. Now, I think the greatest thickness you can get that lime to set is in white-wash, where it can get sufficient carbon from the air to form its original carbonate of lime. The grey limes have all more or less a certain amount of clay, some a very desirable clay, and those go towards forming the same compound we have in Portland cement ; in fact, if you take a good, well-burned brick, and mix that with good ordinary lime, you will have hydraulic or semi-hydraulic cement, and in that way we get all our best and strongest setting limes from these grey limes. I don't just know what the text books would call them. They are not pure lime, but an earthy lime, and my experience is that they are the hardest setting.

Mr. Baker : There is one point that Mr. Hynes has not touched upon, and that is the action of frost, and we would like to hear his opinion on that subject. I have seen two or three authorities, and they differ to some extent.

Mr. Hynes : I am aware that there are a number of things I have not touched upon, but the question put by Mr. Baker is a very pertinent one in Canada. I know there are architects who claim that the mortar being frozen, even in the bed or bulk, is destroyed. That is entirely wrong, according to my opinion. I would like to have it all frozen ; I think if we could have it all frozen we would have a more homogeneous

mass, thoroughly disintegrated in all its parts, and capable of a more complete mixture. Frost has no chemical action on lime ; it is the water that freezes. But when on the wall freshly laid and largely composed of water, the frost comes along, swells and expands the mortar, the result is different. This expansion prevents the lime from cementing with the sand, and the work is destroyed—if partially dry, perhaps only the face is destroyed. In two-coat work this face may be dusted off, well damped and finished, but for three-coat work no chances should be taken of having the first coat frozen.

Mr. Wickson : You think there is nothing in the statement sometimes made that it is all right to freeze plaster dry?

Mr. Hynes : Did you ever see an icicle freeze dry? Water is one of the things you can freeze. If it is frozen how can it be lost? It must thaw before the water can leave it. I know that mortar gets hard and imperceptibly dries, but I cannot understand how it can freeze dry. Many have claimed that work that has frozen dry was the best and hardest. This, I think, was because a greater time was allowed for the necessary chemical action of the lime and sand to form carbonates and silicates before drying. I think there were either mistakes about it being frozen, or else it was frozen when very little water was in the wall—when it was partially dry, and not enough moisture in the work to allow the frost to expand its particles.

Mr. Dick : We had a very good instance of the drying power of frost the other day on the streets. We all know the condition Yonge street was in after the rain a few days ago, principally with horse dung—everything was literally soaked; but it froze hard during the night, and the next morning, when there was a high wind blowing, the particles of manure and dust were flying all over the street. Now, if it wasn't the frost that dried it I would like to know what it was. Every housekeeper will tell you when it is freezing hard that they keep their washing out on the line and let it get thoroughly frozen, and it will dry.

Mr. Pearson : What is the action of frost on the lime? Does it prevent the setting if it is frozen?

Mr. Hynes : I never found it so.

Mr. Pearson : Well, how is it that it rubs off and falls to pieces?

Mr. Hynes : Because the water is swollen out.

Mr. Pearson : Then that does not affect the lime?

Mr. Hynes : No, I do not think it affects the lime a particle.

Mr. Pearson : It is the water between that freezes and leaves it free, the lime forms the best cementing of the particles of sand together, and then the moisture between freezes and expands and leaves it free ; that is the way it rubs off.

Mr. Hynes : Yes, that is the idea.

Mr. Gregg : I don't know whether Mr. Hynes heard the example given by Mr. Dick of the clothes freezing dry on the line; but I think he answered that by saying that if a wall can be left long enough to imperceptibly dry it would be all right, but it is the sudden changes that cause the trouble.

Mr. Hynes : That is it, exactly. If a wall has sufficient water to allow the frost to expand, it is destroyed, but if the water is not there in a sufficient quantity to allow the frost to swell, it is not going to hurt it. It must thaw before it can dry, that is sure, but it may do so imperceptibly.

Mr. Baker : The tensile strength of plaster is increased by the hair, I suppose. I was wondering if the expansion would not have a tendency to shorten the hair, and to separate it in places. I have much pleasure in seconding the vote of thanks to Mr. Hynes.

Mr. Harkness (School of Practical Science) : It is a fact that ice will evaporate ; that is a well known physical fact, and I imagine that plaster frozen on a wall in the early winter, if it were allowed to stand for some considerable time, would dry. The ice in it would gradually evaporate the same as any other ice will, but, of course, I am not able to say whether it would damage the plaster; I would not attempt to pose as an authority regarding that.

Mr. Hynes : I am inclined to think it would not. The more opportunity lime has to form back into its natural state the better. I have heard numbers of plasterers say there is no work so good as that you let freeze dry, but you must not let it freeze when you put it on first.

Mr. Siddall : I would like to ask Mr. Hynes if he has had much experience in mixing colored ingredients with plaster, and what is the mechanical effect on the plaster?

Mr. Hynes : I cannot speak from experience on that. The only experience I have had was in a little hall of the Bishop Strachan School, where we mixed yellow ochre with it. I was very much surprised when I saw it four or five months after to find that the color had almost entirely disappeared. I know it can be done, but you must reckon on the lime destroying a certain amount of the color. While I am on my feet, I would like to tell you that there is a work published in England by Mr. William Miller, a practical plasterer, which I think is the grandest work on plastering conceivable, and if there is any question you want answered you will find it there ; in fact, you will find almost every conceivable inquiry answered. I think the use of coloring matter is quite feasible, but it must be handled with care, and a sufficient quantity made to avoid joinings.

Mr. Gregg : Is there not trouble in getting it on without being clouded and patchy afterwards if it is broken?

Mr. Hynes : Patching afterwards presents a difficulty that cannot be overcome, and there is undoubtedly danger of clouding. You see, lime is a most soluble compound, and when you water trowel or scour the work it brings the lime forward, and that is what gives it the cloudy effect. That can be avoided by having your work underneath sufficiently damp to admit of finish without using water.

Mr. Langton : I was going over the cathedral, and I liked particularly the color of the mouldings of the arches, and I was told that that was due to their being worked with a vertical tool, which kept the same from flowing out evenly. Do you not think it would improve the sand finished surface if the sand were not floated so easily? Is there any way in which we can get a flat surface?

Mr. Hynes : These arches were run with a mould, which cut off the material at right angles, or vertically, as you express it. A large amount of sand was used in the putty with which those mouldings were formed, and the result somewhat approached the effect of sandstone.

The President : Mr. Hynes spoke in his paper of the benefit that would arise by the substitution of staff for the metallic ceiling usually applied in situations where it is subject to great vibration. I would like to know what is the safest kind of plastering to apply where great vibration has to be provided against.

Mr. Hynes : Staff ceilings are most suitable for such plans. Staff is a compound of plaster in which a great amount of fibre or canvas is incorporated, and, being fixed in position by heavy galvanized nails, cannot possibly be dislodged or disturbed by vibration. You can have it perfectly plain or of such design as you may determine. It is well to recognize the fact that there has to be joints ; if plain, have them well caulked with fibrous plaster for decorated work. You can generally so design your work as to cover them with mouldings, plain or enriched.

Mr. Gregg: Would you use plaster at all where there is great vibration?

Mr. Hynes : Yes, you may safely use staff ; it can be nailed on every bearing so as to be perfectly solid. The only point in which there is any danger is that of having joints improperly stopped in plain work. If not well done joinings are liable to show, but it is perfectly sound and solid. Asbestos plaster, so far as yet offered, is simply the waste product of the asbestos mine, consisting of both fibre and ground rock. It is chiefly mixed with lime only. I have never used any except samples. It never gets very hard, but has a very nice quality in that it may be dinged without fracture. Lately it is offered in connection with Paristone. This ought to be a good compound, but I do not recommend unless from

experience. But you are fairly safe in using any good mortar on wire lath, no matter what the vibration.

Mr. Pearson: I wanted to ask Mr. Hynes what are the proper proportions of lime and sand for the brown finish.

Mr. Hynes: For the ordinary sand finish one-fifth sand, one-fifth plaster of Paris, and three-fifths putty. In saying that I am not speaking from exact information, but practice.

Mr. Pearson: Then for the hard white finish; how do you obtain that hard surface like china?

Mr. Hynes: It cannot be done without some cement. I have polished walls by putting equal quantities of putty and plaster, but you have to mix them with glue size or something of that kind, to allow time for working.

Mr. Pearson: For the hard white one-fifth plaster and one-fifth putty, and what sand?

Mr. Hynes: You do not want any sand for hard white.

Mr. Pearson: Then what is the proportion of lime and putty?

Mr. Hynes: About equal, if you pay for it; but you never get it; you cannot get that plaster work unless you pay for it. Hard white finish, as generally executed, is a misnomer.

Mr. Pearson: It is not a misnomer as we specify it, but you do not give it to us. Now the brown, just the first coat?

Mr. Hynes: I always mix about twenty bushels of lime to about six yards of sand.

Mr. Pearson: How many bushels is six yards?

Mr. Hynes: I do not know.

Mr. Pearson: How can you get the proportion?

Mr. Hynes: About one-sixth, I suppose, in the dry, but when the lime is slacked it is increased nearly double, so it becomes about one in three.

Mr. Pearson: Then is there any proportion for hair?

Mr. Hynes: We consider we should put about forty pounds to four hundred pounds of plastering. These are all hard questions to answer. I have never figured them out to my own satisfaction; I am only giving what I practice.

Mr. Pearson: Is there any way of running cornices and mouldings without using too much plaster of Paris?

Mr. Hynes: Yes, if you do not want to use too much plaster of Paris, be very careful to have the cornice well bracketed, the lath formed exactly to the lines of the moulding, and coat your lath carefully with the mortar.

Mr. Pearson: The trouble with fine hanging mouldings or anything like that is filling that out.

Mr. Hynes: Anything hanging must be formed by the plaster of Paris. Of course, if it hangs sufficiently you can carry a line of nails and string in it.

Mr. Pearson: There is another thing, Mr. Hynes. If you plaster a building in winter, and you put on the heat in the building, there is a great deal of moisture being evaporated, and I have noticed in certain places that it does not set for weeks and weeks, and practically rots. What is the cause of that?

Mr. Hynes: The mortar itself?

Mr. Pearson: Yes.

Mr. Hynes: If you leave it alone it will get harder eventually than that which dries more quickly.

Mr. Pearson: But then one cannot leave it for six months.

Mr. Hynes: I don't see any reason why it should stand for six months.

CODE TO GOVERN ARCHITECTURAL COMPETITIONS.

THE sub-joined code of rules to govern architectural competions is the product of the labor of a joint committee representing the Architectural League of New York, the National Sculpture Society, the National Society of Mural Painters and the Philadelphia T Square Club. It received the approval of the Architectural League on January 19th last:—

I. DEFINITIONS.

1 A competition in design is the process by which, on the basis of merit, from two or more designs proposed, one or more are selected.

2. Competitions may be either "open" or "limited."

3. An "open" competition is one in which any person may be a competitor.

4. A "limited" competition is one in which each competitor is especially invited.

5. A competition of either class may be either—

(A) "Premiated"—in which remuneration is provided only for those to whom an award is made.

(B) "Paid"—in which remuneration is provided for each competitor.

6. The promotor is the party who undertakes responsibility for fulfillment of the competition according to its terms, and shall provide for proper and substantial remuneration to each competitor to whom an award is made.

7. The programme is the offer made by the promotor and includes the written or printed statement of the terms of a competition on the basis of which proposals are to be made.

8. A competitor is one who in acceptance of such offer submits a proposals in accord with the terms of the programme.

II. THE PROGRAMME.

9. The programme is an agreement, the terms of which must be carried out in good faith by all parties.

10. The terms of the programme are to be concisely stated and must be mandatory.

11. The programme shall—

(A) Be headed substantially as follows: "Under the general code governing competitions in design of the Architectural League of New York, of which a copy is subjoided,

_____

(Name of Promoter.)

invites competitive proposals upon the following programme."

(B) Contain a definite statement as to proposed cost.

(C) Contain a definite provision as to anonymity,

(D) Name the jury, which must include experts upon the subject under consideration.

(E) Fix uniform requirements for drawings, models or other forms of proposals.

(F) Fix a definite time and place for receipt of drawings, models or other forms of proposals.

(G) Fix the nature or amount of the awards or prizes.

(H) Fix the period of time within which decisions will be rendered.

III. DRAWINGS OR MODELS.

12. The requirements for drawings, models or other means adopted for illustrating or describing the proposals must be clearly defined in the programme; including, namely: that they be uniform as to character of rendering, scale, number and size of separate sheets or pieces, and such other detail as may be necessary in the peculiar circumstances of each case.

13. The requirements for drawings, models, etc., must be of the simplest nature, adequate clearly to explain the design, thus reducing to a minimum the labor and material, necessary in their preparation.

IV. THE JURY.

14. All competitions are adjudicated by the vote of the jury including disinterested experts. If the subject of the competition be such that its execution requires special expert knowledge, then, if permitted by the programme, the jury may call in additional disinterested experts and also the promoter, to advise with them.

14. The order of procedure of the jury shall be as follows:

(A) Reading the programme.

(B) Passing upon the question of calling in expert advisers or the promoter.

(C) Passing upon the work submitted, with reference to conformance with the conditions of the programme. The jury must exclude from consideration proposals violating the conditions of the programme.

(D) Passing upon the manner of arriving at the verdict.

(E) Deciding upon the verdict.

(F) Writing and signing the verdict.

16. The jury may decide whether the prime object of the competition is to select a design, or whether it is a means of test, having for its object the selection of an artist.

17. The jury must make the awards to the competitors as stipulated in the programme.

18. The drawings, models, etc., are not to be placed on exhibition before the verdict of the jury is rendered, and except when otherwise provided in the programme shall remain the property of their proposers.

19. Voting must be by ballot, but procedure otherwise shall be as agreed upon by the jury.

20. The action of the jury shall be final.

V. BY-LAWS.

21. Any subscribing society may prescribe such by-laws additional to this general code of competition and not in conflict therewith as it may see fit; but such by-laws are to be included under a separate head, and indicated as being the by-laws of the particular society prescribing them, and the other subscribing societies shall be served with an official copy of such by-laws.

In submitting the code they added to the report the following statement:

1. It is the sense of this committee that the enforcement of this code and trials and penalties relating thereto involve questions of law on the one hand or of ethics on the other, neither of which are considering as properly within the scope of this general code.

2. It is the sense of this committee that the question of rate and basis of remuneration for services in connection with competitions further than general insistence upon remuneration to each to whom an award is made, is not properly within the scope of a code on competions, but is rather an item of the broader general subject of remuneration, which should form the subject of independent consideration and adjustment.

TERRA COTTA.*

By M. J. HYNES.

Terra Cotta is a very large subject—anything from a doll from Tokay to a glass retort on the Ohio—and I fear a much-abused term. It includes everything made of baked clay, all indeed, with the exception of bricks, which are always, just bricks. Everything else in the category comes under the head of "Terra Cotta."

Terra Cotta is a mixture of clay and brains; the manufacturer supplies the clay, the architect the brains.

It not being my intention to give you a history of Terra Cotta, I shall however endeavor, with my limited ability, from a practical standpoint, to give you something that may possibly enlighten you on the practical utility of this material, for I feel that the knowledge gained by some fifteen years experience may be of some little service to you.

The question has probably occurred to you, and naturally, "Why is it that in Canada, we have not a first-class Terra Cotta Works?" Gentlemen, the answer is with yourselves. Except in a a few individual cases, you do not ask for the material. Possibly you are prejudiced against it, and desire to remain so. It may be that you are not conversant with its utility, its virtues and its beauty, and have either been too busy or too indifferent to look into the matter with that degree of interest and study which the subject demands. While in the United States numerous buildings, some of them twenty stories high, have been constructed of this material, as yet you have failed to put it to anything like general use in this country.

Again you may say, "Why does not some responsible firm in this country cater to the Terra Cotta trade, with artistic work and good material?" The answer is as before, "You have not made the demand on them, and offered but little inducement or encouragement for the expenditure of the necessary money, with which good works are established, wherewith they could place themselves in a position to meet the requirements of the trade, did such requirements exist."

Why did the company with whom I have the honor to be connected for some time, expend large sums in the erecting and perfecting of works for the manufacture of Portland cement, a cement which is acknowledged to be equal to the best and second to none? For the simple reason, gentlemen, that you as professional men demand a first-class Portland cement which could not always be had in the imported article, and having the raw materials in quantities, that for excellence cannot be surpassed, this company met the demand, which demand, as I said before, you are in a large measure responsible for.

The same argument can be applied to Terra Cotta. If you will create the demand, there is no doubt that some responsible firm will rise to the occasion, and will meet the demand with material that will be as good, if not better, in artistic exellence and in quality, as any that can be procured in any foreign country; for in Canada we have plenty of the raw material; we have the capital, and we can soon secure the artists and workmen if we have not got them now. But you have ignored Terra Cotta; you have, with a few exceptions, left it in the background by erecting buildings in an old-fashioned manner and upon principles which, in the first instance, are cheap, and where the possibilities of combustion are apparently of minor consideration.

I may say that I am not advertising any existing Terra Cotta works. I am very much like Micawber, "Waiting for something to turn up," so that my efforts to impart any knowledge or information I have acquired is not in the interest of any particular firm or company, but purely in the interest of the material, which I feel when better understood and more cultivated, will come more generally into use, for its possibilities are practically unlimited.

Since the liquidation of my company in Toronto some years ago, I have been connected with the Rathbun Company of Deseronto, or possibly more properly speaking, of Canada, and I regret to say that during that time three of the brothers in that company have "passed beyond," and in the death of the late Mr. F. S. Rathbun, Terra Cotta has sustained an irreparable loss, by losing one who was alive to its possibilities, and who from a personal as well as a business standpoint was a strong advocate for its use.

It is to be regretted that some of the gentlemen of this Association have openly declared, that were they erecting a building of Terra Cotta, they would place their orders in a foreign country, forgetting, possibly, that they are dependent upon Canadians for clients, and that their utterance must of necessity cause people in this country to believe that no such material as Terra Cotta is being made in this country, or if so, that it is of so poor a quality that it could not be used. I am anxious to impress upon these gentlemen the fact, that the more they do to foster Canadian enterprises and industries, the better materials they will secure, and the more clients they will have, thus benefitting themselves in the end. American architects employed over here in the erection of some of our large buildings have not so acted, for they have always used Canadian material when such could be obtained, and it is a pleasing fact that some of our Canadian Terra Cotta has found its way "over the line."

Without touching upon Egyptian, Assyrian, or even Italian and Spanish of later date, the actual revival of the use of Terra Cotta does not extend back much beyond fifty years. True, in England they made chimney pots and tiles as in European countries, but the English architect in the revival of classical architecture, sought for material that was at once light and durable, indestructible by fire and time, and which would not be an imitation like painted galvanized iron. This he found in Terra Cotta—a material of itself, with a beauty of its own, and not an imitation.

Modern buildings with a skeleton constructed of steel, offer a motive for the use of Terra Cotta, or, in other words, in Terra Cotta has been realized the possibilities of steel construction.

In touching upon the revival of Terra Cotta, reference must be made to England. The architecture of each country has developed its own individuality, and in England had the advantage of such men as Blashfield, Sir Henry Dolton, Sir George Skey, Jennings, Gibbs, Cowan and others; and even in the hands of these men, and under the leading architects of the day, the material as first produced, could not be called beautiful. The South Kensington Museum, and the Albert Memorial Hall, show what might be accomplished, but in no way satisfied the architects or the artistic public. The material in the Albert Memorial Hall was manufactured out of natural raw fire-clay, and having been submitted to open contact with direct heat in the kiln, resulted in twisted and distorted work.

Contrast this work at the Albert Memorial Hall with the gates at Lord Rosebery's mansion, made with clay carefully washed and free from impurities, mixed with broken glass, spar and grog (you must excuse the word "grog," and not take it in the ordinary acceptation; in this instance it is a term applied to fire-clay that has been burned and ground), properly dried and burned; this work could never be taken as an "imitation" of brown stone, granite or any material, but is simply Terra Cotta.

Another instance of success in the early days, is the work on the Dulwich College, carried out after the design of the late Charles Barry, and costing some $140,000.

Terra Cotta received a great impetus when Sir Henry Dolton's Works were erected upon the Thames embankment in London, for the manufacture of this material and other fine art goods. The building and machinery alone represent an expenditure of £1,000,000, the interest upon which at 5% you, gentlemen, can easily estimate. I have just received a letter from a fellow-workman, at one time with me, but who has returned to England to his old shop. He informs me that now there are three Terra Cotta Works, where there was only one when he left a few years ago. The English architects must have created this demand, and I trust Canadian architects will follow their example.

Delf, china, faience, etc., etc., are made at the Dolton Works in Staffordshire, but the manufacture of Terra Cotta has no relationship to these industries at the various branches of the works mentioned.

The work in the United States has made rapid strides. Much has been accomplished, but Englishmen have been at the head, men such as James Taylor, Joseph Joiner, and others, all of whom received their practical education in England. In the United States to-day, the importation of Terra Cotta, delf, china, etc., is visibly decreasing. Why? Because a demand having been created—the architects giving the preference to home industries—investors grappled with the problem, with the result that to-day large works are dotted all over the country, doing a substantial, profitable business, and turning out material equal to the best that could be imported, as witness the work of the several Terra Cotta companies, and the magnificent work at the Rookwood Pottery at Cincinnatti.

Terra Cotta in Canada has failed for two reasons—first and foremost, lack of support upon the part of the architects; second, because every person who connected himself with it, made brick, and making brick takes up about twenty-four hours a day, and leaves very little time for attention to Terra Cotta.

* Paper read before The Ontario Association of Architects, January 18th, 1899.

I fear that those in this country who try to make bricks and Terra Cotta, or Terra Cotta and bricks, will not meet with that success the venture merits, for to use the expression of the canny Scotchman, "Ye canna whustle and mawsticate oaat meal." No doubt a vulgarism, but decidely expressive.

In scarcely two countries will the difficulties met with be the same, though each has sufficient of its own. A man accustomed to follow a certain line of action in one country and with success, will often fail in another; the conditions seem to be peculiar to the country they exist in. Sometime ago a Staffordshire man, who met with success in England, conceived the idea that the possibilites of making money in Canada in the Terra Cotta line were exceptionally good, and a test of certain clays obtained in Canada seemed to warrant the investment, so he made it, and—failed. Then he tried imported workmen, and failed, then imported clay, and failed again. Imported coal he thought would fill the bill, but again failure attended him, so he concluded that to make a success of the undertaking he would have to import British atmosphere.

However, it has been practically demonstrated that Canadian clay is all right, and experiments conducted in Canada have proven that Canadian clay if properly handled and the conditions taken fully into account is as good as can be procured elsewhere, and that material of artistic excellence and good quality can be made here as well as in any other country. This is the result of a vast expenditure of time, money and patience, but the results justify the expenditure.

The dark ages that locked up trade and family secrets (and in Europe trade secrets became often family secrets, and a business would be carried on from generation to generation, from father to son) have now become a thing of the past. Science has reached out, analyzed and brought forth work not only equal to the old, but in many respects far superior,—again let me refer you to the Rookwood Pottery, which is a model of beauty and originality, and demands the praise of the civilized world.

There is, however, possibly an exception in the handcraft of the decendants of the Mexican Indian, where the secrets have been preserved for hundreds of years. These workmen can to-day hand you a water jug, designed with hieroglyphics that may be designated as barbarous, having a beautiful glaze upon the exterior, of a most peculiar nature, which will permit of evaporation and leave the water in the jug cool and refreshing. A fine point like this has not been achieved by the modern worker Another exception can be made in the Japanese ware which leaves so much to admire, to study, to imitate and to learn.

You may think, gentlemen, that I am getting away from the subject—that it is not Terra Cotta—yet under the head of Majolica ware, which embraces all baked clay that has received a color and a glaze, and not porcelain or china, all of this is very much Terra Cotta.

Nature has in this country been particularly generous in its gifts of the various substances that go to make up the component parts of Terrra Cotta. There is a wild rush for the gold of British Columbia and the Klondike, and those who don't rush, are speculating in stocks, but the time will come, and that ere long, when attention will be turned to the gold which we have at our very doors, and which can be obtained by the utilization of the raw products which at present are spurned and considered as worthless. A well-informed person who has practical knowledge of such matters, told me recently that within two hundred miles of Toronto large deposits of koalin are to be found, that in the same section there are large deposits of spar, and stone equal to the best Cornish can be had, while as to the clay the supply is unlimited.

At the revival, Terra Cotta was made of fire clay—the modern product is made of about four parts of clay to one of "grog" (fire clay), and like Colonel Seller's eye water, is often one ingredient short.

Clay good for Terra Cotta is not taken from the surface, which usually contains much foreign matter, and owing to these foreign matters melts at a very low temperature. A pure good clay should be mined like other precious metals, and I am convinced that a judicial mixing of different clays has produced the best results, for all that is desirable is seldom found in one bank; a clay should not shrink much in drying.

Ruskin has compared the perfection of form to the swan, and the perfection of color to the humming bird. Terra Cotta takes the form you impress upon the clay, and architects who visit the works to inspect the models made from their details, are prone to say, that the work never looks so well as in the natural soft, wet clay, and for this reason the manufacturers have been striving to make the finished material have as far as possible the appearance of the soft, wet clay, and the clay model the appearance the material will have in the finished state.

Upon the architect depends the finished material. If his conception be good, and the artist follows that conception to the satisfaction of the architect, then the finished material becomes a work of art; but if the conception be bad, and the architect will not permit the artist to improve upon it, (and the very fact that the artist is a clay worker should have some little weight), the finished material is anything but a work of art, and the manufacturer, seldom the architect, is scoffed at, and the unjust impression goes abroad that he cannot produce good work.

But the architect is often placed at much disadvantage, for the model he is asked to accept may be of a reddish clay upon a white plaster background, and the finished material to be of a cream buff color; really it would seem that for the time the architect should be color blind, and simply look for "perfection of form, but not of color."

In the matter of color much may be said. One man will require a shade of buff, the next a peculiar shade of mahogany, another a shade of grey with a "light sky blue feeling," and each is disappointed if he does not [illegible] just the particular shade he thinks he desires, but which if produced and erected in a building, might cause him to "take a trip abroad," until kindly time and the weather had softened the tones and shaded the surface of the structure.

What Mr. Waterhouse, the eminent architect has said on Terra Cotta, I am thoroughly in accord with—that is, that it should be made in small pieces—that large lintels, large columns of enormous proportions are successfully manufactured, but it is with a great deal of care, a great deal of time and a great daal of expense, while the virtue of the material is in relatively small pieces.

Waterhouse contends that the slightest settlement of a building will cause the large lintels, sills and transoms to crack; while if made and constructed in small pieces the mere settlement would be the opening of the mortar joints.

I have always found the tendency on the part of architects here to make their work in Terra Cotta conform as much as possible to stone construction. I have successfully made pieces containing 13 and 14 cubic feet, but I contend that such construction was an error.

The late Mr. Joseph Joiner, of Indianapolis, puts the maximum at 7 cubic feet, but I feel that there is beyond this a limit to which its use may be extended.

I will hand to your Registrar a specification such as I consider tenders should be based on; also a list of information which manufacturers require in order to tender in a practical way on Terra Cotta work.

I leave this matter with your Registrar. It may possibly be that some of you will find occasion to refer to it in future, as I have found that specifications for Terra Cotta work have not been as thorough as those used for carpenter and plumber's work.

You have now Terra Cotta in all colors at your disposal; all American Companies advertise Terra Cotta in all colors glazed and semi-glazed, while an English firm came out with an advertisement some years ago, "A new building after every shower."

Glazed Terra Cotta, so far, has not met with much success, but I feel that it could judiciously be introduced in particular places.

Sir Henry Dolton said that a new Terra Cotta job never looks well. It had to be seasoned with soot.

We have some few samples of different Terra Cotta in Toronto There is some Italian, some English, some American and some Canadian. The Oak Hall building affords a good illustration nf how architecture may be embellished with sculpture, but the Italian Terra Cotta was not sufficiently burnt for this climate. The winter has caused some of the figures to drop an arm or a limb, which are now glued on with cement.

The obelisk laid in the sand of Egypt for centuries, but it started to desintegrate as soon as erected in Central Park, New. York. This shows the necessity of well burnt Terra Cotta for this climate. All the Canadian Terra Cotta is standing as fresh as the day it was put up.

We are constantly brought into opposition with stone. I might ask you to examine some of the buildings erected in that perishable material. The baulstrades that surround Osgoode Hall have entirely disappeared, while many of our finest buildings are showing the marks of desintegration. In a well burnt piece of Terra Cotta you have something that is indestructible, being proo against fire and time.

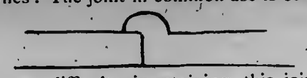
DISCUSSION.

Mr. Burke:. There was a time in my experience when the mention of terra cotta made me feel like using strong language, and vowing that I would never have anything to do with it. My advice to architects is not to use it unless they can get the contract placed with a very large firm, and to take plenty of time. If they expect to get the terra cotta in about two or three weeks after they have placed the full sized drawings with the manufacturer they will be disappointed. I suppose the President in mentioning my name in connection with the discussion of this subject had reference to my experience with terra cotta in the erection of the Simpson building. In regard to size, I came to the same conclusion as Mr. Hynes: I do not think you can get a thoroughly straight piece of work more than two or three feet in length; to get it in greater lengths than that seems to be practical impossibility, and when building with terra cotta, below the first storey, it is a question whether it is safe to put it in even in that size. With regard to lap-joints, I suppose that Mr. Hynes means that he would make a rebate at the edge of each piece of terra cotta, a mullion and insert this slip which would have the rivet on itself, and cover that joint. At the Simpson building, where there were so many cornices, I gave it up with regard to weathered joints in the terra cotta; I simply made the weatherings of cast iron, thin sheets of cast iron with the lips cast on the iron. These weatherings are carried on iron brackets bedded in the terra cotta, and lipped over the edge of the mouldings so that no wet whatever can get into the terra cotta beneath. That seems to me the simplest way in our climate, where almost any material of a clayey nature is in danger of disintegration by frost. I was very much interested when reading the account of

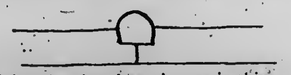
the Home Life Insurance fire, in finding how thoroughly the terra cotta withstood the action of the fire. As Mr. Hynes said, the chief injury was caused in that part of the building which was marble. About the only iron work seriously injured was a girder which by an oversight had been left unprotected in one of the upper stories, not covered at all in fact. I agree with Mr. Hyne's remarks in regard to Mr. Waterhouse, I think his conception of the treatment of terra cotta is the true conception, and if you have examined the details of the building you cannot fail to be impressed with that fact.

Mr. Pearson: Will Mr. Hynes show us a sketch of that water joint.

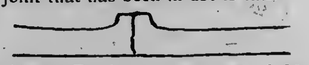
Mr. Hynes: The joint in common use is of this form.



There is great difficulty in retaining this joint intact. I contend it would be better if it was carried out in this way.



The other joint that has been in use is this.



The President: Don't you approve of Mr. Burke's method of carrying the terra cotta?

Mr. Hynes: No, I cannot think of terra cotta as such an inferior material as to render it necessary to cover it with sheet iron; if it is good, it does not want anything to preserve it.

Mr. Pearson: It is not the terra cotta that the trouble has been with, it is the joint.

Mr. Hynes: Well, I only give my own idea or suggestion of a joint to get over the difficulty. Everything has been used, copper flashing and everything else has been introduced, and this lap-joint has been constantly breaking off; a great many of these pieces are thrown away because of that little lap being broken off. The form I show is fairly practical, and does not show any mortar joint, and, besides, it is cheap.

Mr. Gemmell: That is the second drawing.

Mr. Hynes: Yes, the centre one.

Mr. Gemmell: What is to prevent a little moisture getting beneath the edge and breaking it off?

Mr. Hynes: I never saw any terra cotta break off that way; the difficulty has been where it was broken off before it got into its position.

Mr. Siddall: I had an experience here in Toronto which I never had before in carrying out terra cotta work. We had some terra cotta work in a building which was built in, and when built in it looked better than anything I had ever seen; it was perfect in alignment, finish and everything else. But after it had been in position for three or four months I found that the surface had begun to scale off, in some of the worst cases as much as a quarter of an inch in depth. I have never yet been able to find out the reason for that.

Mr. Hynes: A similar case came to my notice in Chicago. It was under the supervision of Thomas Taylor, a man very well enlightened in such matters, and who carried out the job very successfully, and it was placed satisfactorily to the architect and all the parties concerned. But after the first year he got a report that it was peeling off. He could not realize it at first, but he went and found that it was so. There is a clay that is used a good deal in the modelling shops, and the degree of heat that would affect that would turn the ordinary red clay into a vitrified mass before this potter's clay I speak of would be affected. Some of the modellers clay got into a thin slip and was thrown over the slack clay to keep it damp with water, and it went through the pulp mill and this clay did not become amalgamated, it did not become a heterogeneous mass, and wherever that was the case it just rolled up in layers, and after the first winter it showed up. It is possible that what you allude to may have arisen from the same cause.

Mr. Siddall: In the old country it is the custom to supply the ordinary full size drawings, because when you have four or five drawings, the modelier does not take your profile at all, he has to enlarge it. In the building I speak of, every moulding and profile was drawn twice, once to shrinkage rule and once to the orrdinary full sized scale. That is the only way you can get perfection. Of course the clay will shrink in burning, and in the old country that has been calculated to a nicety, and they will furnish rules to you to measure two feet plus what is necessary to allow for shrinkage.

Mr. Hynes: In pretty nearly every place where terra cotta is manufactured on a large scale, they employ a firstclass draughtsman, and these draughtsmen enlarge from the small up to the standard scale. The red clay I have used has gone as far as an inch and a quarter in shrinkage, while white clay only goes nine-sixteenths of an inch; that has been the total shrinkage to the foot.

Mr. Pearson: The figures Mr. Hynes has given as to breaking strains, afford no criterion to go by, because terra cotta is used as a hollow material, and it has to be backed up; and the backing up is what one has to depend on, and one cannot count on the outside face of the building in the thickness of the walls where you exceed in height three or four stories. In backing up terra cotta with brick there is always a space that has to be filled in or grouted, and it is a very difficult matter to get that done properly. Then, even if it is done, it is not safe to count on it bearing its full load. I do not think that terra cotta can be used in the same way that stone is used, for the reason that it is always a hollow material. Another thing that Mr. Hynes spoke of was having a wash on the surface of the terra cotta, and he is very strongly in favor of having the natural finish. That is all very well, but when you get a number of pieces and place them together they do not harmonize, there is a great difference in the shade; and when you get one piece very much more strongly colored than another, it is not always satisfactory. I do not see why there should be such a rooted antipathy to this wash. They do it in the States, and the buildings there appear to be satisfactory, and where that wash is used the surface finish is more satisfactory than we can get otherwise.

Mr. Hynes: In reply to Mr. Pearson, I might say there is no piece of terra cotta of such a shape that it cannot be stood up and filled thoroughly with cement and brick previous to being used; if it is set into the wall in the hollow form, then there is a great deal of difficulty in filling it. With reference to the straining power of terra cotta, which Mr. Pearson says is of no account, an architect who is no here to-day, said to me, "The difficulty with your terra cotta here is that it is too soft." I said, "Yes; where do you get soft terra cotta?" "Well," he says, "there is that job down on King Street." I said, "Where did you try it?" "Oh," he says, "just by looking at it." I said, "That is hardly a fair test. I will guarantee that you cannot produce a brick that will cut as hard a chisel face as that terra cotta."

Mr. Pearson: I do not think that Mr. Hynes is right in saying that terra cotta can be filled before it is set up in the building, because it has to be bonded into the wall. It may be right enough to do that with mullions.

Mr. Gregg: I have much pleasure in moving a vote of thanks to Mr. Hynes for his valuable paper, and I may say I would be very glad to see him here among us. Some of us remember him as one of our best modellers in plaster and terra cotta, and we have missed him for some time. We are sorry to hear of the death of his employer in Deseronto, but we hope that we may in the future see more of Mr. Hynes, and that he will have some place where we can see his work and consult with him.

Mr. Pearson having seconded the resolution, it was carried.

Mr. Hynes: I can assure you that it has afforded me much pleasure to be present with you, and if I can be of practical assistance to any of you it will afford me much pleasure. I hope at some future time to be able to give you some practical illustrations in the School of Practical Science as to the qualities of terra cotta.

THE BUILDER

[THIS DEPARTMENT IS DESIGNED TO FURNISH INFORMATION SUITED TO THE REQUIREMENTS OF THE BUILDING TRADES. READERS ARE INVITED TO ASSIST IN MAKING IT AS HELPFUL AS POSSIBLE BY CONTRIBUTING OF THEIR EXPERIENCE, AND BY ASKING FOR PARTICULAR INFORMATION WHICH THEY MAY AT ANY TIME REQUIRE.]

Items in Estimating.

THE tendency of the country builder is to overlook small items when estimating cost of a building, or to "bulk" a lot of small things together. Both these methods are wrong and likely to prove embarrassing and costly in the end. Every item should be figured on, then the style and finish should be considered, also the quality of material used. A few items are given herewith in a general way, merely to show the manner of dealing with them as they present themselves. Get the entire surface of the floors in square feet, add one-fourth for waste in fitting, etc., and if the stuff is more than one inch thick, make provision for extra thickness. Two men working together will lay more flooring in one day than one man alone will lay in two days. Two men working together will lay five or more squares a day. Five pounds of nails are required for each square of flooring. Ordinary $2'' \times 4''$ partitions should not cost more than two cents per foot running measure for labor. Doors and door frames should be estimated at so much an opening, including door, hanging, fitting and completing, exclusive of cost of material and fitments. As doors on each flat vary in size, finish, and style of fitments, each door should be estimated separately. Estimate cost of materials, locks, hinges, nails and screws according to specifications. Don't overlook closets, but make provision for shelves, wardrobe hooks, hook strips and such other fittings as specifications call for. Linen closets are often fitted up with drawers, shelves, small cupboards with doors, etc.; figure on each item, including hardware attachments. Base should be figured on as moulded, unless it is perfectly plain, then it may be put down as dimension grade lumber. Cost of laying base will vary with the style and number of members in the base. Where rooms are wainscotted (matched stuff), take surface measure and add one-fourth; count cap and shoe as mouldings. Bathroom finish should be estimated carefully according to specifications in the absence of details; top for bath tub and front, weather panelled or ceiling; water closet seat and front, wash stand front, drawers and door, water-tank and covering for pipes, and all cutting for pipes usually done by the builder. Mantels of wood or other materials should be carefully figured, ascertaining as nearly as possible the design and work necessary to place them. In estimating stairs, if the builder intends building them himself, he should figure the lumber in the wall and face strings and center bases, cost of housing and cutting same, lumber in treads and risers, and cost of preparing same; figure all newels separately, hand-rail by the foot, balusters by the piece, labor and nails for setting up if soffit is panelled or ceiled with matched stuff or prepared for plastering. Fitting and hanging sashes: Cost of hanging may be ascertained by the number of pounds in the weights, cost varying by cost of iron. Plastering is measured by the yard, and great care should be exercised in estimating it in order to get the correct measurement. Angles, closets, spandrils, soffits, and everything, should be measured. If it is desired to estimate the lath separately, about 14 lath will cover one yard. One man will put on about 300 yards of lath in one day. Plastering, including lathing and furnishing all materials, is frequently done from 20 to 30 cents per yard, according to the number of coats and style of finish. These may be accepted as pretty low figures. Plaster courses are estimated by the foot running measure, the cost varying according to style and width. Angles and mitres count so much a piece, measurement always taken from the longest points. Painting is estimated by the yard, and requires as careful measurements as plastering. Special work, such as graining, staining, varnishing or polishing, is paid for by the piece or by special arrangement. These are but a few things, but they will give the estimator an idea of "how to proceed" in estimating.

Chimneys and Flues.

IT is a well-known authenticated fact that nearly 75 per cent. of all the fires that occur in dwellings, and very many other buildings, have their origin in defective flues. This percentage could be greatly reduced if the builder would exercise a little more care in the construction of his chimneys and the proper distribution of the woodwork around them. Chimneys should be built from foundation to coping clear and independent of any woodwork. Where the stack passes through a floor or roof, the trimming timbers should work clear of the brick or stone work at least one inch, and the roof boards and flooring should clear the stack nearly as much. The slate or shingles will of necessity be close to the brickwork, but should be so put as not to interfere with the chimney's settling—for all chimneys will settle a little—for should the roof covering prevent the upper part of the chimney from settling along with the lower part, the stack will break at the line of junction with the roof, and the crack may be large enough to admit sparks and smoke, and the house may take fire from this cause. The same argument applies to the floor; the woodwork must be kept clear of the chimney. No flue should be less than 8×8 inches, or the length of one brick square in the clear, and this size should be maintained from bottom to top, regularly built—not contracted at some points and expanded at others. The walls adjacent to the flue should be laid close, and every joint of the

bricks slushed or entirely filled up with mortar. The inside of the flue should be well pargetted or plastered with a mortar that will adhere to the bricks; simple lime-and-sand mortar will not be effectual, although used in common, if not almost universally. When the flue becomes heated, which it will at times, common mortar will peel and chip off and leave the joints exposed for the admission of smoke and fire, and at points where the woodwork, such as flooring or timbers supporting the same, approaches too near the brickwork of the flue, will ignite, and the fire will extend between the floor and ceiling along the joists, and have control of the building before it is visible to outsiders or inmates of the house, and the building is either seriously damaged or entirely destroyed for the want of a little care and attention in the construction of the flue. Pargetting mortar should be made with a portion of cow's hair in it, in about the same proportion as used in mortar intended for the first coating of wall plastering. Horse manure, in about the same proportion as cow's hair, thoroughly mixed with the lime-and-sand mortar, makes a very effectual pargetting, and when well put on will remain as long as the flue lasts. As a further safeguard, at the intersection of floors and roof the thickness of the flue walls might be swelled out so as to give a thickness of walls at these points of not less than 8 inches. There is no constructional difficulty in this, and the chimney would be rendered doubly safe. A perfectly safe flue may be made by using ordinary glazed drain tiles of sufficient size for the flue, building them in as the chimney is being constructed. These may be obtained in suitable sizes, and T lengths can be had, which may be inserted in the flue, leaving the wing or third part to project through the wall for the reception of stove pipes, or for admission of air for ventilation purposes. A flue, constructed with tiles in the manner suggested, would be as near perfection as it is possible to build a flue.

Finding Some Angles.

SOMETIMES builders are puzzled to find proper angles and shapes to suit the work in hand. A few little problems and their solutions given herewith may prove of material service sometimes. Suppose we want to find an angle bracket for a cornice, proceed as follows: Let A, Fig. 1, be the common bracket; draw the parallel lines, ooo,

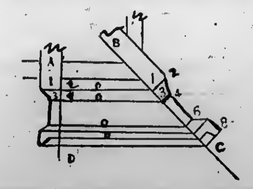


FIG. 1.

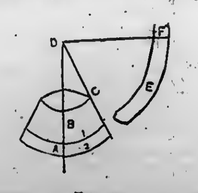


FIG. 2.

to meet the mitre line C; square up on each line at C, and set the distances 1, 2, 3, 4, etc., on the common bracket, from the line D, on the small lines from C; through these points, 2, 4, 6, etc., trace the form of the bracket, and the work is done. To find the form of a base or covering for a cone, let A (Fig. 2) be the width of the base of the cone. Draw the line B through the centre of the cone; extend the line of the side C till it meets the line B at D; on D for a centre, with 1 and 2 for radii, describe E, which will be the shape of the base required; F will be the point for the same. When this (E) is obtained, it may be bent around the base at A, and its edges will be in a horizontal line. In other words, if the cone stands on a floor, and E be bent around its base, the lower edge of E will coincide with the plane of the floor. To find the shape of horizontal covering for circular domes, the principle is the same as that employed in the last problem, but, supposing the surface of the dome to be composed of many plane surfaces. Therefore, the narrower the pieces are, the more accurately will they fit the dome. Draw the line A through the centre of the dome (Fig. 3), divide the height from B to C into as many parts as there are to

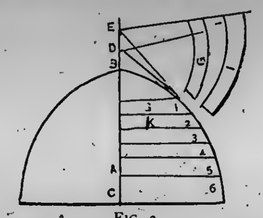


FIG. 3.

be courses of boards or tin. Through 1 and 2 draw a line meeting the centre line at D; that point will be the centre for sweeping the edges of the board G. Through 2 and 3 draw the lines meeting the centre line at E; that will be the centre for sweeping the edges of the board K, and so on for all the other courses. Care must be taken in drawing the lines from the face of the dome to the central line A, so that false centres are not obtained. To divide a line into any number of equal parts, let A B (Fig. 4), be the given line. Draw the line A B, at any convenient angle, to A C; set dividers any distance, as from 1 to 2, and run off on A C as

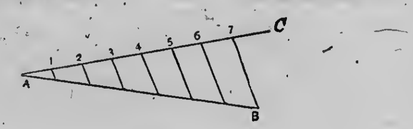


FIG. 4.

many points as you wish to divide the line A B into—say 7 parts; connect the point 7 with B, and draw the lines at 6, 5, 4, etc., parallel to the 7 B, and the line A B will be divided as desired. This is a very simple problem, and is absolutely correct. To find the cut for any angle where a moulding or other angle has to joint, proceed as follows: Let A and B (Fig. 5) be the given angles; set off from these points of the angles equal distances each way, and from these points sweep the arcs

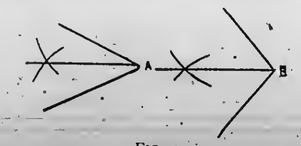


FIG. 5.

of circles, as shown in the figure. Then a line from the point of the angle through where the circles cross each other will be the cutting line required. This is one of the most useful problems in practical carpentry and joinery.

Diagonal Bond in Brickwork.

NOT very often, but sometimes, the bricklayer is called upon to "lay up" a diagonal or a herring-bone wall, and and it is fitting he should be able to perform the work without much trouble. The following illustrations and

descriptions will materially help him in laying out the work. Fig. 6 shows the method of describing a 4-inch wall in diagonal bond with English facing. Draw the facing bricks first, then take the diagonal length of four bricks A to B, strike an arc B C; from C, with half a brick radius, strike arc D E, join E A, and from E, the point of intersection with BC, draw horizontal line EF.

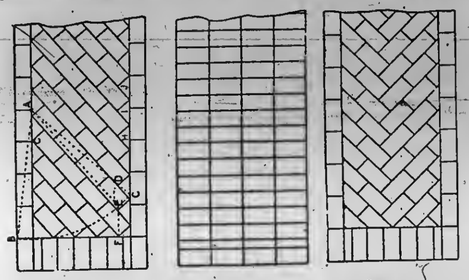


FIG. 6. FIG. 7. FIG. 8.

From F draw F G parallel with E A, to form one of the diagonal points; all the others may be obtained by drawing parallel lines at half-brick intervals. This method enables the diagonal bricks to be laid without any cutting, but it may be preferred to fill in solid the triangular end spaces H, I, J, etc.; then the diagonal points should be laid at an angle of 45°, and the bricks cut to fit. Every alternate course must be all headers, as shown in Fig. 7, and the diagonal courses may rake alternately from right to left. Fig. 8 shows herring-bone bond, the interior bricks being laid at 45° and cut to fit the face bricks. This bond should also be laid in counter directions.

Toronto Builders' Exchange.

THE Toronto Builders' Exchange have requested the City Council to grant that body representation on the Board of Management of the Toronto Technical School and the Toronto Industrial Exhibition. The fact is mentioned in support of the petition that the Exchange represents one of the most important lines of industry in the city and the expenditure of a very large amount of capital. In view of the large number of young men who will every year pass from the technical schools into the ranks of mechanics in the building trades, it seems a fair proposition that the employers should have some voice in deciding what courses and methods of study are most likely to produce an efficient class of workmen. This appears all the more necessary since it is sought to substitute to a large extent a technical education for the old-fashioned apprenticeship system.

LEGAL.

ORR BROS. VS. FELLOWS.—The plaintiffs, a firm of contractors doing business in Toronto, entered into a contract with Charles Fellows to execute the brickwork of a pair of houses on Sussex ave. Plaintiffs reduced their tender for the work by $100, in consideration of being permitted to use some brick and stone the property of defendant. They also agreed to accept as the last payment a note of the defendant for $250 drawn for a period of three months, renewable, and bearing interest at 6 per cent. The revised form of contract was used, which contract was signed by Charles Fellows. At the completion of the contract plaintiffs learned that Ruth Fellows, wife of the defendant, was the owner of all the property, and she refused to endorse her husband's note for $250. Defendant was his own architect and inspector, and issued no progress certificates. The specification contained a clause that no extras would be allowed unless agreed on beforehand in writing and signed by the owner and the contractors, which was not done. The contractors sued Ruth Fellows for $250 balance of contract, $205 for extras and $40 for refusing to permit them to make use of the old material. The High Court of Justice appointed Mr. Edward Morgan, Junior Judge of the County of York, as sole arbitrator to decide the dispute. The arbitrator found that Charles Fellows was merely the agent of the his wife, and therefore that his wife was responsible for the payment of note given by him. The plaintiffs were awarded $250 in respect of the contract price, $129.37 in respect of extra work, less a deduction of $44.45, for work rendered unnecessary by changes in the plans and specifications, and certain work imperfectly done by plaintiffs, leaving a balance due the defendants of $334.92, with interest thereon since Feb. 28th, 1898, together with costs of action. The plaintiffs' claim of $40 for not being permitted to use the old material was not allowed, as this point in the agreement between the parties was not embodied in the contract.

EFFLORESCENCE ON BRICK.

TORONTO, Feb'y 4th, 1899.

To the Editor of the CANADIAN ARCHITECT AND BUILDER.

SIR,—As far back as June, 1894, the architects and builders of British Columbia, in using pressed brick, were troubled with a white substance coming from the brick which greatly disfigured the surface of the work. They wrote to the Ontario Architects' Association asking if they could suggest a remedy that would completely destroy or prevent its appearance on the face of a building. The answer was, as near as can be remembered, as follows:—"There is no process known which is effectual in preventing the exudation of magnesia from brick work. The using of acids and oils is not satisfactory. The problem of how to avoid it, is one which has for a long time given brick manufacturers a good deal of anxiety, and if any of our readers are possessed of any useful information on the subject we will be pleased if they will contribute it."

I am inclined to think there is a possibility of the mystery being solved. Mr. F. J. French, a man well-known among the building fraternity, and a good number of the architects of Toronto, who has been in the brick manufacturing and building for a good many years, informs me that he has been studying and experimenting on the destruction of this white substance for years past, and is confident he has solved the problem. Chemicals, he says may destroy it, but that treatment is expensive; his process is simple and sure if strictly adhered to.

The remedy was placed with one of the largest firms of brick manufacturers in the province, in May of 1898, in order to give it a thorough test, which he is sure will prove satisfactory.

Yours truly,

A CONSTANT READER.

PERSONAL.

Mr. A. F. Wickson, architect, has been elected chairman of the Board of Management of the Toronto Technical School.

William J. Home, a well known Toronto contractor, died at his residence in that city a few days ago, at the age of 64 years.

Mr. F. H. Sexton, sr., who for upwards of thirty years has been identified with the building trade in Toronto, died in that city recently at the age of 67 years.

Mr. Robert Thompson, formerly of the firm of Turnbull & Thompson, builders and contractors at Paris, Ont., died in that town recently at the age of 79 years.

Mr. M. R. Burrows, architect, recently of Detroit, Mich., has opened an office in Sarnia, Ont., and will be pleased to receive manufacturers' and dealers' catalogues and price lists.

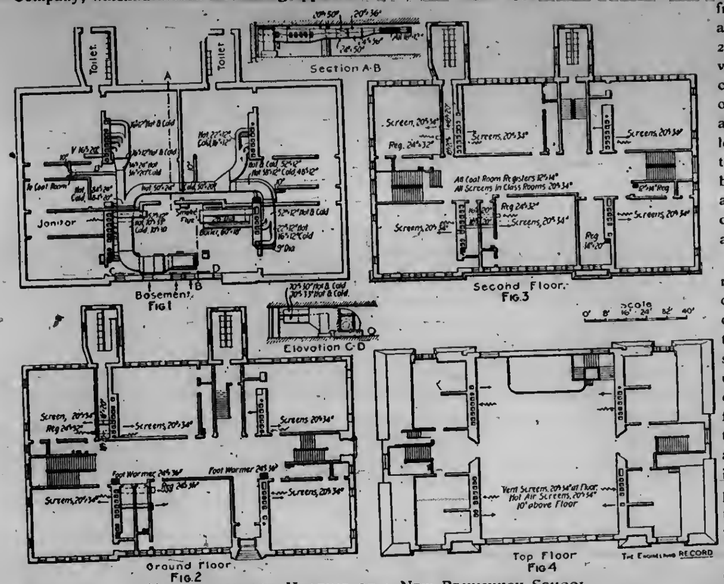
The news of the death of Mr. William G. Willis, manager of the Hobbs Glass Works at London, Ont., was received with widespread regret. Mr. Willis had been in the employ of the Hobbs Company for 23 years, and was universally respected.

Mr. H. Mamizu, chief architect of the government of Japan, visited Toronto recently in connection with a tour of inspection of public library buildings. Mr. Mamizu is collecting data to be used in the erection of a national library at Tokio to cost $300,000. He states that of late years the Occidental style, with its ingredients of brick and stone, is replacing wood architecture in Japan.

VENTILATION AND HEATING OF A NEW BRUNSWICK SCHOOL.

The new high-schooll building in St. John, New Brunswick, Canada, is heated by an unusually complete indirect blower system for a building of its size. Air is supplied by the double-duct method, the mixing of the cold and hot air taking place at the base of the various tresh-air flues.

The building was erected from the plans of Mr. G. Earnest Fairweather, of St. John, and the heating system was installed by Mr. Thomas Campbell from the designs of the B. F. Sturtevant Company, which furnished the heating apparatus. The following description is reprinted from the Engineriag Record of New York:—"The building is a three-storey and basement structure, measuring about 78 x 128 feet in plan. Figure 1 shows the basement, in which the machinery and apparatus of the plant are located; Figure 2, 3 and 4 are plans of the ground, second and top floors respectively. The entrances and stairways for the pupils are at either end of the building and are connected on both the ground and the second floors by a central corridor provided with coat and cloak rooms for teachers and for pupils. There is an entrance for teachers and visitors at the front of the building, and over this is situated the principal's office. Two parts of the building projecting from the rear, and accessible through hallways adjoining the cloak rooms, are used for toilet rooms. These are located in the basement and on the two floors above, as shown on the plans. The top floor is chiefly given up to a large assembly room occupying the center of the floor, with two small rooms on either side separated by continuations of the main stairways which rise in dormer windows, as shown in Figure 4.



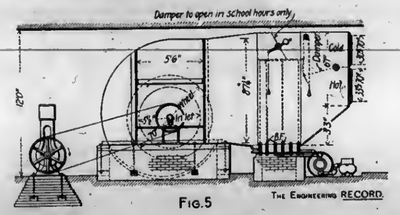
VENTILATION AND HEATING OF A NEW BRUNSWICK SCHOOL.
The B. F. Sturtevant Company, Boston, Mass, Engineers.

A single boiler located in the basement furnishes steam for the heating coils and for the steam engine, which drives by belt a 7-foot blower capable of discharging about 40,000 cubic feet of air per minute at a speed of 180 revolutions per minute. Air is drawn into the basement of the building through adjacent windows, and is forced by the blower through heating coils of the sectional-base type, containing 5,000 linear feet of 1-inch steel pipe, equivalent to a heating surface of about 1,700 square feet. The coils are provided with a by-pass leading to a system of cold-air ducts, located above, and separated from those conveying the hot air. An elevation of blower and heating coils is shown in Figure 5. A damper in the by-pass is only opened during school hours, as cold air is, of course, not needed when warming the building previous to its occupation by the pupils. The outlet chamber of the blower is also provided with a hinge damper, which is ordinarily allowed to project against the current of hot air so as to divert a sufficient quantity to temper the cold air passing through the heater by-pass. The two systems of ducts, the cold above the hot, are suspended around the center of the basement, decreasing in size as branches are taken from them. There are four interior walls extending through the building, and in these are located the flues, both for heating and for ventilation. The branches from the ducts lead to the bases of these flues, as shown in Figure 1, and a mixing of the air in the two takes place at this point. The mixing dampers are of the Sturtevant hinged-cylinder type, and are controlled by hand from the room to which the flue leads. The air supply of each room may have, therefore, any temperature desired, irrespective of that of any of the other rooms, within the limits of the temperature of the outside air and that available from the heating apparatus. Fresh-air inlets to the class rooms are located 8 feet from the floor, and those in the assembly room 10 feet. They are 20 x 34 inches in size and are provided with wire screens. Air is carried through similar screened openings located at the floor and almost directly below the inlets, leading to flues rising alongside of the heating flues. The flues are brought together into four groups at the roof, where four ventilating covers serve to discharge the vitiated air into the atmosphere.

As shown in the drawings, floor registers are provided in a number of places and are supplied by circular flues. These are located in the cloak rooms, and two of large size in the ground-floor hall are for use as foot-warmers. Where the class rooms are separated from the flue wall by a cloak room or corridor the fresh air is carried in a short duct as shown. Under these conditions it is necessary to lead the corresponding ventilating duct from a floor register underneath the floor to the ventilating flue.

The toilet rooms are given no direct supply of air, but are provided with ventilating flues to carry away the foul air and to assist in maintaining a passage of air from the corridors into these rooms. This is brought about by a slightly greater pressure of the air as it is delivered by the blower into the main part of the building. At the third floor, pipes lead from the top of the flues to brick ducts above the third-storey ceiling, where they discharge to two of the ventilating centers."

This method of heating is now being introduced in this country



by Messrs. G. W. Reed & Co., Montreal, who are the Canadian agents of the Boston Blower Co., and who have earned an enviable reputation for good workmanship.

RESTORING THE ACROPOLIS.

On a stone of the temple of "Winged Victory" on the Acropolis at Athens an inscription has been found stating that the monument was built by Kalicrates, who was one of the architects of the Parthenon at the beginning of Pericles' government. This fixes its date at about 450 years before Christ. The Athens Archæological Society is about to undertake the restoration and strengthening of the Parthenon. Marble from Pentelicos will be furnished free for this by the company working the quarries.

A bill has been introduced in the Ontario Legislature to incorporate the Toronto Hotel Company, with a capital of $1,500,000 in shares of $100 each, for the purpose of carrying to completion the project for the erection in Toronto of a first class hotel building.

LONDON BUILDERS' EXCHANGE.

THE first annual banquet of the above Exchange took place at the City Hotel, London, on the evening of the 2nd inst. The chair was occupied by the president, Mr. William Jeffrey. The following, among others, were in attendance: Major Beattie, M.P., Wm. Smith, John M. Moore, School Trustee J. M. Logan, Ald. Jolly, Wm. Joanes, George Craddock, School Trustee Jones, ex-Ald. Belton, ex-Ald. Stevely, George Kernohan, Wm. Edgecombe, W. D. Willis, W. T. Pace, A. T. Corp, E. Fitzgerald, Geo. Hayman, John Logan, Walter Toll, John Hayman, jr., Geo. T. Gould, Wm. Tytler, Hy. Stratfold, Ed. Martyn, Harry Sing, L. Boss, John Sullivan, John Bryan, Thomas Edwards, E. Garratt, Edward Skuse, Wm. Nutkins, Robt. Gash, R. J. Haslett, Thos. Ridge, John Fenn, I. Quick, J. Fleming, R. Skelley, A. M. Legg, Wm. Packham, Robert H. Berry, Henry Kerr, Fred Deeley, Fred Garratt, Albert Evans, H. R. McDonald, H. C. Simpson, Edward Gardiner, Frank Simmons, A. Riddell, Ald. H. M. Douglass, Ald. P. McPhillips, Ald. H. Dreaney, E. H. Russell, T. A. Parkinson, W. F. Wyatt, Wm. Hayman, J. Garratt, Alex. Burnett, Arthur Nobbs, John Whittaker, Jas. Reid, A. Schabacker, Geo. Mortimore, Thomas P. Oglesby, C. Colerick, A. Stewart, Arthur H. Cooke, John Jones, James S. Luney, W. J. Anthistle, A. J. Humphrey, Thos. R. Wright, Wm. B. Walker, James Moran, E. E. Nugent, ex-Ald. Gerry, H. Hayman, John A. Heaman, Thos. McKinley, Charles Simmons, Thomas Inge, George Taylor, Richard Griffiths, Scott Murray, George Everett, George Tambling, Isaac Sargent, Wm. Chamberlain, George Howe, George Fox, Edward Jury.

Letters of regret were read from Col. Leys, M.P.P., Col. Culver, United States Consul; Mayor Wilson, Fred. Henry, H. C. McBride, Herbert Matthews and Col. Lewis.

The chairman referred to the friendly feeling and other benefits which had resulted to the trade since the organization of the Exchange a year ago. Testimony to this effect was also given by Alderman Garratt, William Smith, Thomas Jones, and Henry Stratfold, who were called upon to respond to the toast, the "Builders' Exchange."

Messrs. George Craddock, William Joanes, John M. Moore and Thomas E. Oglesby, responding on behalf of the toast "Our Architects," congratulated the builders on the success of their organization.

The usual loyal and patriotic toasts were duly honored.

The proceedings were enlivened by a liberal supply of music, solos being given by Messrs. H. R. McDonald, Edward Gardiner, Harry Stratfold and H. C. Simpson; violin solos by Mr. David Murray, and a duet by Messrs. Galpin, Stratfold, Simmons and Riddle. Mr. Fred. Fitzgerald was accompanyist.

The London Builders' Exchange is a thoroughly alive organization, and if as wisely managed in the future as during the first year of its existence, is certain to prove a benefit to all branches of the building trade.

Bill—"Has the boss raised your pay?"
Jill—"Well, no; he hasn't been able to raise it for three weeks now."—Yonkers Statesman.

"Time Costs Money."

To Count the Cost of a Lathing you must not only consider the first price, but also the amount of time and material used in applying it.

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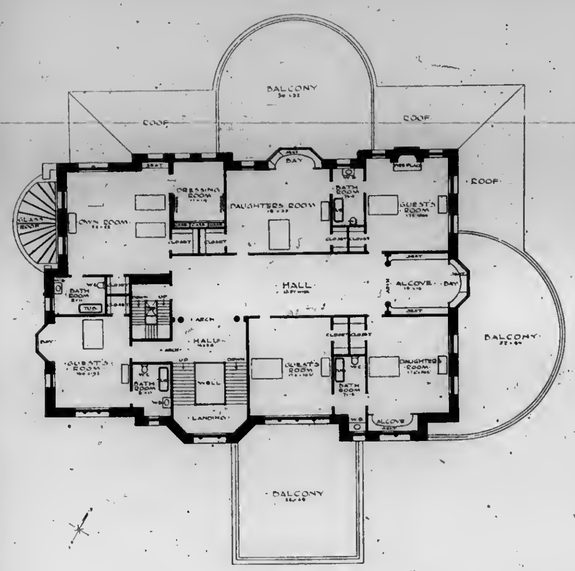

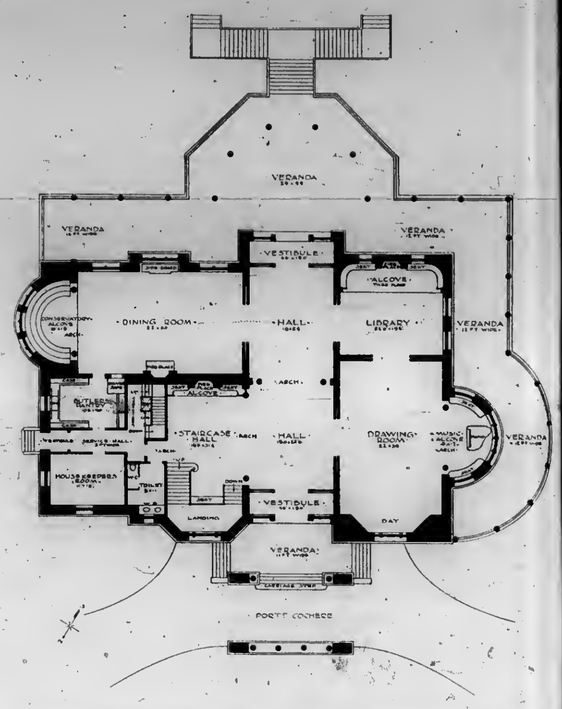

RESIDENCE OF MR. G. T. FULFORD, BROCKVILLE, ONT.
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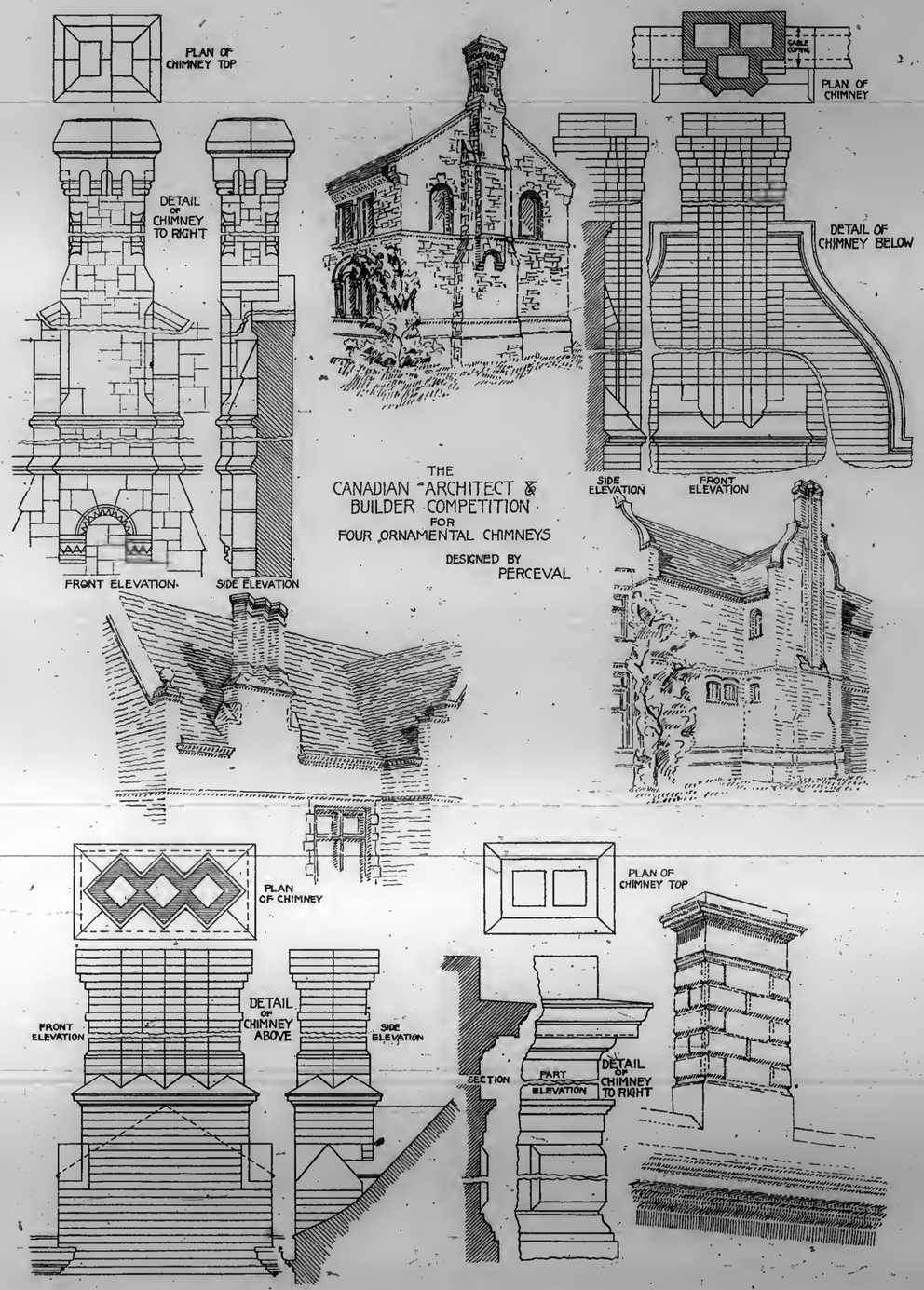
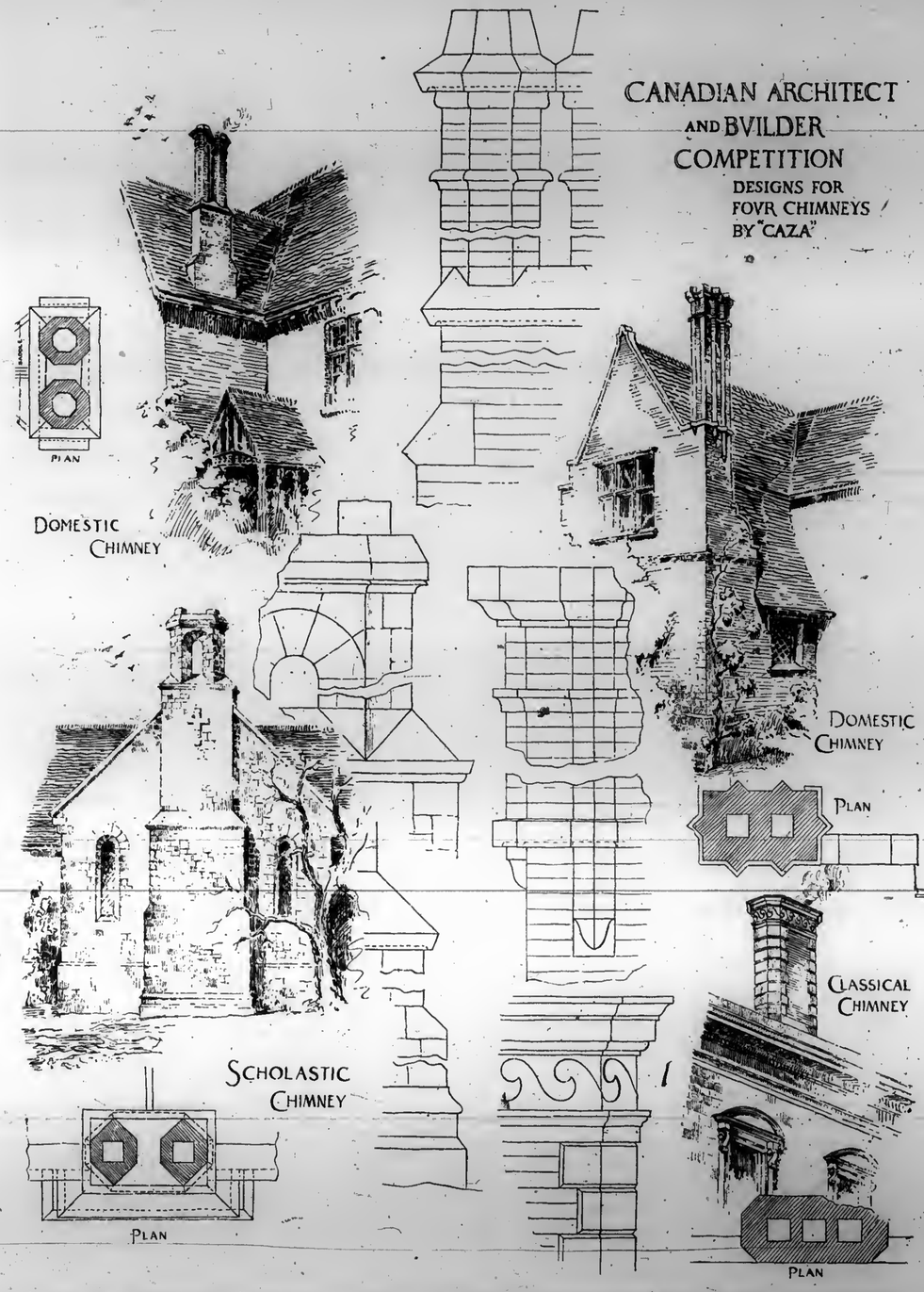


C. A. & B. COMPETITION DESIGNS FOR FOUR CHIMNEYS.—BY "PERCIVAL" (MR. ELMER H. RUSSELL, TORONTO).

INTERIOR OF HOUSE ON BEACON HILL, VICTORIA, B.C.
S. MACLURE, ARCHITECT.

HOUSE ON BEACON HILL, VICTORIA, B.C.
S. MACLURE, ARCHITECT.



C. A. & B. COMPETITION DESIGNS FOR FOUR CHIMNEYS.—BY "CAZA" (MR. A. H. CHAPMAN, TORONTO).

PRICE OF THIS NUMBER 35 CENTS.

CANADIAN ARCHITECT AND BUILDER.

VOL. XII.—No. 3. MARCH, 1899 { PRICE 20 CENTS. $2.00 PER YEAR.

—THE—
CANADIAN ARCHITECT AND BUILDER,
A Monthly Journal of Modern Constructive Methods,
(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD).
PUBLISHED ON THE THIRD WEDNESDAY IN EACH MONTH IN THE INTEREST OF
ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.
The C. H. MORTIMER PUBLISHING CO. of Toronto, Limited,
Publishers,
Confederation Life Building, - TORONTO, CANADA.
Telephone 2362.
Branch Office: NEW YORK LIFE INSURANCE BUILDING, MONTREAL.
Bell Telephone 2299.

SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to foreign subscribers is $2.50. Subscriptions are payable in advance. The Journal will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrears of subscription paid.

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Prices for advertisements sent promptly on application. Orders for advertisements should reach the office of publication not later than the 12th, and changes of advertisements not later than the 5th day of the month.

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This Number.

THIS Spring Number of the CANADIAN ARCHITECT AND BUILDER is intended as a substitute for the Special Number which until this year it was our custom to publish at New Years. It is destined to mark the opening of the building season, and we trust will meet with careful examination and the appreciation of our readers. We are indebted to Mr. Ernest Wilby for the excellent piece of design displayed on our front cover page, and to the other friends who have kindly contributed articles of special interest for this number.

The Season of '99.

THIS number is intended to mark the opening of the last building season of this century. In Toronto the season has already opened, a considerable amount of building being now in progress. Indeed, operations in that city were not entirely suspended last winter, except during the extremely cold weather. In the opinion of the majority of architects and builders, satisfactory foundations and walls cannot be properly constructed in winter in this climate, and throughout the country as a whole, little is attempted during January and February. In Toronto, however, the temperature is as a rule much higher than in most localities. Some architects and builders in recent years have endeavored to shorten if not close up entirely the gap which has separated the building season of one year from that of another. Judging by the number of enterprises already commenced and projected, the outlook for this year is most encouraging for architects, builders, workmen, manufacturers and dealers in building materials, and others whose welfare is dependent on building activity. The cost of building is likely to be enhanced at least to the extent of recent advances in price of materials. It is to be hoped that contractors' figures may likewise be increased to a point which will allow of a reasonable margin of profit. The season of 1898 was satisfactory so far as the volume of work done was concerned, but on all sides the com-

plaint was heard that contractors could make no money owing to the prevailing low prices. After a long period of inactivity, anxiety to obtain work was such that prices were cut much below the point where a fair profit could be realized. In some trades, as for example, plastering, the desire of some contractors seemed to be to secure an extraordinary share of the available contracts. To accomplish this bids were lowered below the profit line, and the whole trade suffered. It is most desirable that during the present season contractors should in their tenders allow for a fair margin of profit, to which they are entitled. Unless there is united action in this direction, the improved conditions which have now set in, so far as revival of building enterprise is concerned, will add little to the prosperity of contractors. In Toronto a few speculative builders are resuming operations. It is not probable, however, that building of this class will assume large proportions, as the loan companies, who were heavy sufferers by the building boom in the early years of this decade, will be certain to adopt a very conservative policy with regard to loans for this kind of enterprise. An encouraging sign of returning prosperity, so far as Toronto is concerned, is to be found in the recent sharp advance in real estate values, amounting in some localities to $15 per foot, within a period of six to eight months. A rumor has been current to the effect that it is the intention of some of the unions of workmen connected with the building trades to demand an increase of wages. We trust that no obstacle of this nature will be thrown in the way of the returning tide of prosperity for which all have been waiting. Under the agreement made with the employers, the workmen have been paid the same rate of wages during the years of depression as prevailed in times of greater activity, and to this cause, in conjunction with the increased competition brought about by scarcity of work, is due the absence of profits experienced by contractors for several years past.

Compensation to Workmen.

A just fate overtook the Bill introduced by Mr. Crawford in the Ontario Legislature to provide for compensation to workmen who might be injured through accident while in the discharge of their duties. Some of its provisions were altogether unfair to the employers, and would have resulted disadvantageously both to employers and employees. For example, the Bill made it compulsory for the employer to notify the Government of any accidents that might occur to any of his workmen, regardless of whether he might have been informed of the occurrence or not, the penalty for default being $100—half of which sum was to go to the informer. Thus, a workman who might sustain a slight injury, and make no mention of it to his employer, could arrange with an acquaintance to lay information with the Government against his employer, and to divide the spoils. Legislation of this nature should not be introduced for the purpose of catching the workingman's vote, but should be framed in the most careful manner, so as to equitably apply to all interests involved.

An Interesting Fact.

Architects and plastering contractors will be interested in a test which was recently made by a plasterer in Toronto of the qualities of metal lath. The test was the outcome of the offer by a firm of manufacturers to supply metal lath at a considerably lower price than that of a competing firm. The plasterer, who is one of the most experienced men in his line in the city, undertook to decide for himself which material would in the end prove the cheapest and, all things considered, the best. In the presence of the agent of the company offering the cheapest lath material, he had two pails filled with plastering material made up in exactly the same manner, and with this he proceeded to plaster a piece of each kind of lath measuring 48″ x 15″. The result showed that about 60 per cent. more plaster was required to cover the cheaper lath than was necessary to cover the more expensive kind, and that by using the more expensive kind of material, the contractor would effect a saving equal, if not greater than that which it was claimed the use of the cheaper lath would give him. There was an additional advantage due to the fact that it required much less labor to apply. The actual amount of plaster used for the pieces, 48″ x 15″, was 19 pounds as compared with 31 pounds.

The Licensing Architects.

The results of the operation of the law enacted by the Legislature of Illinois compelling architects to pass examinations and take out licenses, as set forth in the report of the Board of Examiners just to hand, are encouraging and satisfactory. During the period beginning September 21st, 1897, and ending the 11th of February, 1899, the Board passed upon 787 applications for licenses, 714 of which were granted and 73 rejected. There has been no opposition to or wilful violation of the law, and no prosecutions have therefore taken place. On the other hand, application for licenses has been made by almost every person claiming to be an architect within the State. This is certainly a wonderful showing in behalf of legislation of this character, and affords the strongest possible argument in favor of extending the law throughout the United States and in other countries. There is now a bill before the legislature of California which will require all architects of the State to take out a license at an initial cost of twenty-five dollars and an annual cost of five dollars thereafter. In Quebec the principle has received recognition, and architecture is now a close profession. We have no doubt that in Ontario likewise legislation of a similar kind will be enacted. The Society of Civil Engineers have now a bill before the Ontario legislature which is designed to close the ranks of that profession to all but duly qualified persons. If this bill should pass, there will remain no argument for refusing to place the profession of architecture on the same footing.

Many substitutes as a pigment have been offered from time to time for white lead, but there is nothing which will beautify and at the same time preserve that to which it is applied as will white lead. The characteristics of the good article are its affinity for linseed oil, its opacity and covering properities and its durability as a paint.

A British Columbia paper is authority for the statement that the Masters' and Servants' Bill was introduced in the Legislature by Mr. Macpherson, of Vancouver, to prevent Mr. Tompkins, a Brockville contractor who has carried out a number of contracts with the C.P.R., from importing Ontario workmen to perform work in British Columbia at wages 50 per cent. below what would have to be paid to local workmen.

HOUSE DECORATION.

A sign of the times is the number of journals either devoted to, or giving space regularly to, household decoration. It is a sign that in this country and in the United States the habit of mind is moving on from absorption in the mere necessities of life to a desire for some of its amenities. This desire has arisen first with women, who in America are the nearest approach to a leisure class, and the journals which give attention to household adornment are, for the most part, ladies' journals, or depend chiefly upon women for their subscription list. The ideals aimed at are defined usually by the feminine attributes "cosy," "dainty," etc., and the kind of work that is described is such as can be done at home and may be generally described as imitation architecture. All this may be welcomed as an indication that there is creeping in some relief to the squalor of a life devoted entirely to business; but the squalor of a false pretentiousness in art is not so respectable and is more repellent. If, as seems to be the case, it is an early stage of a people whose intelligence is more fully developed than their culture, it must pass soon from this superficial imitation of architectural effects to an appreciation of their essence, and it is best worth while to consider in what the essence of domestic architectural decoration consists.

At the bottom of all architectural effect is plan. The decoration of a room for the attainment of character is best begun with the footing courses of the building. The character to be attained will come under two heads —dignity or "cosiness." The latter, which we may call the domestic manner, seems to be the special development of modern planning, and the recipe is briefly a compact complexity of arrangement; complexity, that is to say, not for its own sake nor for the sake of variety, but to match the complexity of modern domestic life by arranging the area of rooms with such artistic precision that there are no waste spaces. For this reason the floor plan is irregular and there is often much irregularity in the rooms themselves; for windows which are placed only with a view to catch the light or the sun are often bowed; fireplaces which are designed only for the greatest snugness are likely to be nooked; furniture which, like the sideboard, is of such dimensions as to be immovable is provided with a home of its own, recessed so as to be in the room without claiming unnecessary side space; while the hall, which is at once an entry, a waiting room, a place for storing outer garments out of the way, an approach which should invite to the principal rooms with encouragement of good things beyond, and which should indicate the stairs with equal promise but without encouragement, is a field for the ingenuity of the architect about which, if there is to be much comfort in little space, one can predicate little but that variety is assured. The wall treatment of such a plan is devoted in the first place to further emphasis of its complexity by furring down the ceiling in recesses from the main area so that they are subordinate in height as well as in area. It is obvious that when this is done the scheme is all there. Details aim rather at fitting into and emphasizing the arrangement than at attracting special attention to themselves; moreover, economy through force of taste is the idea at the bottom of this manner of work; elaboration is therefore not the note for detail so much as simplicity. Such details as are used have also preferably some function to perform. The picture moulding, the dado capped with a shelf, the built seat and cabinet recess are much in use. The picture moulding will run at the level of the lowered ceilings over recesses, forming an angle finish under these ceilings and the bottom member of a frieze for the loftier central area. The central area will thus be the only part that will have wall decoration proper, for the space between the dado and the picture moulding is properly, in a simple dwelling, devoted to pictures, and the only effort expended upon the wall is to obtain such texture of material as will keep the surface from being dull, though, as a background for pictures, it should be plain. Sand finish plaster, burlap or decorators' canvas and other stuffs are in use; but here is a field for invention and discovery. There is no limit to the variety of material that would be suitable, with the proviso that it must be sanitary. This proviso, unfortunately, excludes such depth of texture as would collect dust. The frieze of the central area, being the crowning member of the principal part of the room, and being above the line of pictures or other movable decoration, may be the field for any degree of elaboration in any form of work. It is perhaps an evidence of the excellent quality of this domestic manner of housework that the conventionally accepted architectural forms, which are made according to regular patterns and by multiplying processes, do not look at home in such a room as this—not because they are too good, but because they have not enough life in themselves, but, when they are acceptable, are acceptable as factors in a scheme which is a scheme of proportion only. Here interest in all parts is best, and, though simple work will do, the best work is not out of place in the frieze of a living room. It is a field for wall painting—decorative figure or decorative landscape—for carving or for modelling in plaster. It is time that the practice of modelling in plaster directly on the wall was revived, and a running scroll founded on some flowering plant could be quickly and suitably rendered upon a frieze of this kind, for here if anywhere the slight irregularities of hand modelling would be in place.

For dignity the essential difference is lavishness of space—not large space so much, that lavishness which pays no heed to the exact space required for each function, but squares out to an all-comprising area which does not fit the necessities so much as include them, having in view an aim beyond mere necessity—the attainment of regular form for its own sake. The ornament, or decoration proper, is therefore in this key. Its furnishings or features have more to do than to fill a function; they have to maintain a character. A mantel piece is not merely a convenient shelf on which things which please the eye may rest to adorn the local centre of comfort or on which books and tobacco may be found to minister to it; in a dignified room a mantel piece is in itself a dignified composition, which may have, and often has, no other function than beauty. Walls are not merely walls, but a tripartite composition. Doors and windows have a function to perform, but this makes not the limit of their form, but only its motive. Each is a door or a window, but it is also a composition. Finally, everything—mantel, doors, windows, sideboard, or whatever else is necessary—though in itself a composition, is but part of a whole, which is the room; and, if the greatest dignity is sought, all rise together to the cornice, which unites them all in one. It follows then that, in this manner, the abstract architectural forms which jar with cosiness find their proper use, which is to minister to a unity, self-existent and admirable for itself, in which the comforts of a home can be spread rather than fitted and not be the less comfortable for the more stately housing. The ultimate home of details to suit this manner will generally be found to be Italy; but there is not much hope for the designer who borrows from Italy, either directly or through France, instead of making the principles which are at the bottom of Italian or French work his own. These principles would repay research, but the present space barely suffices to make this attempt to classify the two domestic manners.

It should be said in conclusion that cheap effects, which form so much the object of study in the decorative articles before alluded to, are proper to neither manner. The only form of economy possible in good work here (as in good work of any kind) is the economy of abstinence. Decoration which is founded on plan may be slight or copious, plain or rich, and good in all cases if the material is good, but only if the material is good; and neither the householder or his architect is wise who attempts too much for his money by aiming at the greatest quantity rather than the best material.

"Since the birth of time, throughout all ages and nations, has the craft of the smith been held in repute by the people."—Longfellow's Evangeline.

BY THE WAY.

It is interesting to learn the precautions taken to conceal the identity of the competitors in the recent competition for plans for the proposed University of California at San Francisco. The designs, it will be remembered, were lodged in the Musee Royale des Beaux-Arts, in Antwerp. There they came into the hands of Belgian officials and employes. Photography has been employed to demonstrate to the competitors and others how the designs were kept concealed until the hour arrived when they were to be brought before the jury. The cases containing the drawings were covered with paper, securely tied and sealed with wax bearing an official stamp. The door of the room containing them was also effectually sealed. The next stage was to prepare the drawings for inspection. A photograph shows that no less than thirty men and boys were employed to make stretchers and to mount the plans. Every indication of a motto or other clue to authorship was carefully concealed. The plans were then covered with paper, tied and sealed. There was no likelihood of prepossessing in favour of any design, or of prejudice against it, when a design came before the jury. Each had to depend on the impression which was made when it was revealed. There was no confusion or liability to confound the design of two competitors.

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The Municipal Council of Paris has decided to give prizes to the architects and constructors of the six handsomest houses that may be erected during 1899. The owners will be exempted from half of the increased assessment for improvement to the properties. Fifty-two sets of plans have been handed in for a similar competition held last year. This is an excellent method of awakening public interest in architecture, and effecting an improvement in the character of building designs. The associations of architects of Ontario and Quebec should try to induce the cities of Montreal and Toronto to copy the example of Paris in this direction. Failing that, they should consider whether they themselves could afford to offer prizes which would induce architects to enter a competition of this character. The appointment of experts to judge the designs and award the prizes might be left in the hands of some competent and independent authority. I am of the opinion that a competition of this character, properly organized and conducted, would direct public attention to architecture and awaken a widespread interest in the subject such as would not result from public lectures or any of the other methods which have been suggested from time to time to time at the architects' conventions.

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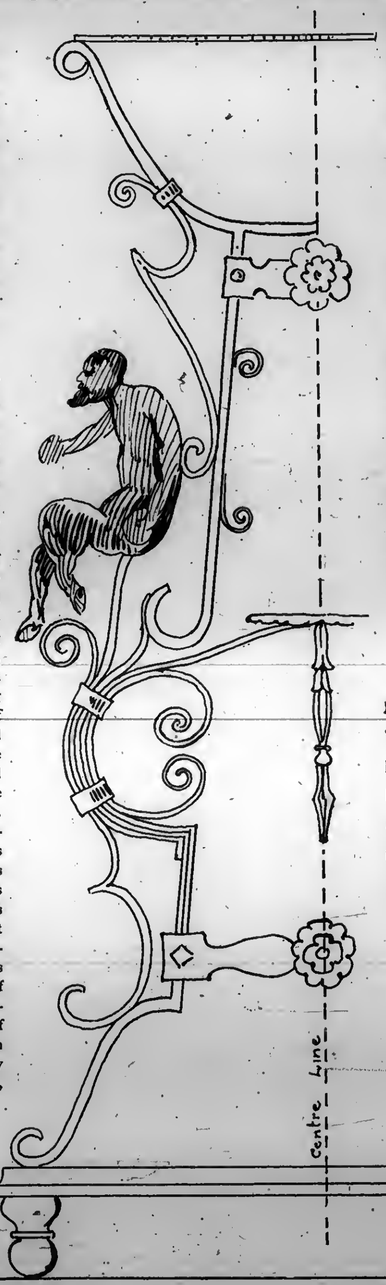
In the construction and decoration of railway coaches and passenger steamers there has in the past been little demand for the services of Canadian architects. As a rule, in this class of work only the best materials are employed, and in many instances better results might have been attained if the disposition and treatment of them had been placed in the hands of skilled architects. This fact is being recognized by the Bertram Company, who have at present in hand the construction of the new steamer "City of Toronto." They have engaged the services of Messrs. Bond & Smith, architects, to design and supervise the decorations of the new vessel which is to equal in character the steamers of the famous Fall River line. A series of relief panels illustrative of Canadian history will adorn the walls. The decoration of the saloon will also be elaborate in character. In like manner it is the intention of the Richelieu and Ontario Navigation Co. to modernize all their steamers.



DETAIL OF TRIPOD STAND, WROUGHT IRON. ITALIAN 17TH CENTURY, IN SOUTH KENSINGTON MUSEUM. SCALE-¼ FULL SIZE. MEASURED AND DRAWN BY William Rae.

PAINT SKIN COVERING FOR FLOORS, WALLS, ETC.

This covering is produced in Germany by applying oil paint or varnish paint on very thin tissue paper, reinforcing the first coat, after drying, by any desired number of further coatings, and decorating same so that the whole constitutes a strong, tough oil paint skin. This is fixed by means of an adhesive agent, such as oil or resin, putty or paste in sheets on the surfaces of the floor or wall. These paint skin coverings are an improvement on ordinary interior and decorative painting, inasmuch as they can be produced at a factory and can thus be decorated in a more tasteful and thorough manner than is possible in painting by the use of stencils and the like, says the "Farben Zeitung." Furthermore, the decorations can be patched and repainted by applying new sheets in worn out places.

Plastique Bordin, a paint to protect wood or iron against the action of acids, is said to be obtained by the melting together of resin with powdered charcoal, spermaceti and animal charcoal with admixture of linseed oil varnish and vaseline, the proportions varying and being adapted to the respective demands upon the elasticity of the coating. The preparation of the paint should take place shortly before application.

PAPER HANGINGS.

Paper hangings were originally made on sheets of paper pasted together, each sheet being of the size of paper then made, which was called Elephant, and measured about 22 × 32 inches. These were joined so as to make a length of 12 yards. On this primitive arrangement patterns were stencilled sometimes in several colors, and considerable dexterity was shown in the adjustment of the stencils.

When paper making machinery (which is practically what is now in use) was introduced, single lengths of 12 yards were substituted, and huge blocks of wood, which were in reality wood-cuts, were used to print the patterns instead of the stencils. This method is still in use, and is called hand or block printing. Each color to be used has its own block, and the color of one block must be dry before another is applied. The workman stands before a framework in which the block is suspended, and by means of a foot lever passes the paper under the block, and at the same time brings pressure on the block to evenly print the pattern on the surface. Another section of the paper is then brought by guide pins exactly in place under the block, and the operation is repeated until the whole length is printed.

This process, on account of the weight of color applied, is still in favor for certain classes of paper, but the advent of the cylinder presses for calico printing also revolutionized the printing of paper hangings. By means of this machine all the colors are printed at one time, and what occupied hours under the old system only requires a few seconds under the new. In these machines each color has an engraved copper cylinder, which is so arranged on the large cylinder as to make with the others a complete pattern. Small vats with brushes supply an even amount of color to the cylinders and the printing proceeds with perfect exactness.

The lowest grades of paper hangings are called "brown blanks," the paper being of a light brown or grey color, and the pattern being printed on without a background. "White blanks" follow these, the only difference being in the quality of the paper. Formerly the ground of the next grade was printed with the pattern, this being called "blotch printing," but the practice now is to brush the ground color evenly over the surface before printing the pattern. These were formerly called "grounds" or "flats," and these names are still applied to the better qualities, though without special reason. Various surfaces are given to the ground by the application of French chalk, which is polished to produce what is called "satin finish"—by the dusting on a sized ground of finely powdered mica, to produce what are variously termed "glimmers," "silks," "micas," etc.

The addition of bronze to the pattern forms another class of paper-hangings, which addition is probably the most lucrative operation for the manufacturer. Two methods are followed—the first being the application of the bronze held in a solution composed mainly of potato starch, these being called "liquid bronzes" or "gilts." In the second process the size is first applied to the paper as a color would be, the bronze is dusted on this size when at the right period of "tack" or stickiness. These are called "varnished bronzes" or "gilts." All of these processes are also followed in the hand or block printed papers. To give additional texture to the surface, various embossers are applied, such as leather, gros grain silk, canvasses of various weaves and fancy patterns. This is carried to a further point when the pattern of the paper is duplicated in the embossed roller and is thus raised from the surface. These are called "raised" or "pressed" papers.

Wallpapers differ from most other fabrics in that while great variation exists in the quality of the various materials used, the materials after all are only of secondary importance. The paper is only used as a medium for transferring a pattern to the wall. Thus, various other materials may with perfect propriety be imitated in wallpapers. Expensive leathers, silks and tapestries are reproduced in paper and excellent effects are thus obtainable. The European manufacturers lay all the museums and palaces of the old world under tribute for designs, and the American manufacturers busy themselves in reproducing as rapidly as possible these designs in less expensive and consequently inferior grades. But a number of the leading designers and architects of England contribute many original designs for paper-hangings. Among others may be mentioned Walter Crane, Lewis F. Day, J. D. Sedding, Shand Kydd, and others. Their designs are not in imitation of other materials, but purely in the line of ornamental or floral treatment, and are for that reason more favorably regarded by many.

It may be said, in conclusion, that while the materials as before remarked are secondary to the design, as much difference exists between desirable and undesirable qualities of wallpaper as in other fabrics.

W. H. Elliott.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

The committee which was recently appointed to look about for more suitable rooms to serve as headquarters for the Association, have recommended that the necessary accommodation be procured up town. The Council of the Association have adopted the recommendation, and on the first of May the Association will remove from the rooms which they have occupied for a number of years past in the New York Life Building, Montreal, to new quarters on St. Catharine Street, in the building in which are the rooms of the Canadian Society of Civil Engineers.

AN ART MUSEUM FOR TORONTO.

The following memorandum is printed in a conspicuous position in the catalogue of the exhibition of the Ontario Society of Artists, now in progress:

"The need for an Art Museum in Toronto has long been felt by those who are interested in the progress of art in the city and Dominion.

"During the last twenty years various projects for buildings suitable as a home of the fine arts have been considered, and have not been found sufficiently comprehensive to raise the enthusiasm of those who realize the importance of the question.

"The members of the Ontario Society of Artists, believing the time has arrived in the city's progress when steps should be taken to carry out this important requirement, have during the past season had the whole subject under consideration, and in the near future they hope to be able to present some suggestions and plans for such a much-needed institution."

The death is announced of Mr. James Perry, one of the oldest and most respected contractors of Ottawa.

BRITISH COLUMBIA LETTER.

No. I.

TERRA COTTA FINIAL, TOWER MUNICIPAL BUILDINGS, TORONTO; HEIGHT, 13 FEET.

On first entering Victoria, the visitor is not very favorably impressed, for should he arrive on an ocean steamer he is landed at the outer wharf nearly two miles from the centre of the town and is hurried along in his cab past the chemical works, flour mills, lumber mills, etc., that line the banks of the harbour hereabouts; he catches a fleeting glimpse of the Provincial Government Buildings, which are on his right, as James Bay Bridge comes into sight on his left front, with its unsavoury adjunct the Reclamation. Very slowly and cautiously he is driven across the dilapidated old bridge which is in the last stages of decline, thence bumpity-bump over the worn out macadam of Government Street to his hotel. Should our traveller arrive coastwise from Puget Sound ports or from Vancouver he is discharged, that is the most suitable term, on a dirty wharf crowded with a rather tumble down lot of buildings, and picks his way up the steep outlet to fall into the hands of a yelling mob of hotel and cab touts. To reach Government Street he turns abruptly into Bastion Street, passes the positively hideous court house, and so on to his destination. Visitor, whom we may presume to be of the genus architect and of an observant and enquiring disposition, takes an early opportunity of critically examining our street architecture, hopeful of finding much of a virile western character to interest him, but is doomed to disappointment, for the buildings prove to be almost wholly flat roofed, two storied structures of a feeble nondescript sort with a monotonous skyline of open parapets and crude cornices; painted brickwork prevails, and our friend quickly realizes that the business portion of Victoria contains little of architectural interest.

We refrain from giving his criticisms of the variegated sidewalks with their playful habit of suddenly letting the wayfarer down a foot or two when he steps on the loose end of a plank—the other end jumping up at him in an alarmingly threatening manner, neither do we judge it wise to repeat his vitriolic comments on the spikes which "stub" his toes and threaten to trip him up.

The first building which attracts attention as a very decided exception to prevailing mediocrity and excites feelings of interest and pleasure is the Bank of Montreal, an excellently well handled little piece of English Renaissance in its modern interpretation, handled with refreshing breadth of purpose and simplicity: the steep roof and the management of the parapet line is delightful, and the architect Mr. F. M. Rattenbury, is to be congratulated on eschewing all galvanized iron sham detail, all painted and striped brickwork and for putting a roof and not a deck on his building. The Banking Hall is pleasingly and carefully detailed, though reasonable objection may be taken to the streaky effect of the marble die of the counter and it seems out of place to surmount fine marble columns with plaster instead of bronze capitals, the impression received being akin to that afforded by the clay feet of the Golden Image, for the effect is somewhat paltry.

The Five Sisters Block though not exactly a new building is one of the more recent improvements, a plain red brick building with mansard roof, with refined detail throughout, marred by its execution in painted metal, a hopelessly lifeless material to design in. The Bank of British Columbia though not lacking a certain degree of dignity is rendered trivial by its overload of cement and metal ornament, some of which is flimsy; the style is a conventional style of Italian; the little single storied Bank of British North America is a quaintly plain piece of granite work with an entire freedom from the tawdiness that distinguishes so many buildings; the Dricord Hotel from its size and importance as an hostelry next commands attention, which its archetectural merits could not earn for it; the Board of Trade Building and the new home of the Colonist newspaper are attempts in that species of American architecture which is described by the ubiquitous reporter—as "That Splendid Block" or "That Handsome Structure," both having much of the swaggering, braggadocio, painted sand galvanized iron, rock faced stone and tuck pointed brick genus of features which may be more but generally are less original and cannot be deemed architectural.

The new Post Office and Custom House occupies a fine site commanding the approach to Government street from the James Bay Bridge and is a big solid mass of stone work, three stories in height, with a great mansard roof. The whole is bold in appearance, designed in a characterless version of modern French Renaissance, but very coarse in detail and uninterestiog; the Post Office has a pannelled ceiling, heavy in effect and certainly not beautiful; the screens are quite ugly and the upper portions filled with a vulgar sort of stock pattern description of stained glass contrasting strangely with the huge radiators built of stacks of uncompromisingly utilitarian iron pipes gorgeously arrayed in gold paint. The building as a whole is a fair type of Dominion Government Official Architecture and causes one to deeply regret that this sort of work is not offered to public competition with assessors of known ability and undoubted professional standing, in the manner now commonly adopted by public bodies in the Old Country to the great gain of the British public and of Architecture. This system of competition first revealed to England the wealth of architectural talent she possesses in such men as Aston Webb, Ingross Bell, T. E. Colcutt, E. W. Mountford, Hare, Belcher, Gibson & Russell, Carpenter & Lugdow, Bloomfield, Bryden, Waterhouse, and a host of others, who originally proved their calibre in competition work. But for the wise course adopted by inviting great and small to compete on the fairest of terms for all the important works which 25 years ago were customarily entrusted to the tender mercies of the Town Surveyor or some petty official fossilized by long service in departmental grooves, many of the ablest architects would have never secured the longed-for opportunity; moreover one has but to consult the architectural papers to fully realize the splendid educational work that is done by competitions fairly conducted.

But all this, as Rudyard Kipling says, is another story—still the digression may be excused as a natural one forced from us by sad experiences.

The most important work now in progress is a five-storied flat roofed red brick building on Government Street, designed by Mr. T. C. Sorby for Messrs. Weiler Bros.; it is a warehouse probably 60 x 120 or thereabouts, with three frontages unbroken by any projections except those afforded by string courses and cornices; the building is unpretentious in a good honest "A warehouse is a a warehouse," mode which is distinctly refreshing; the stone fronts are cleverly detailed and the few decorative features are refined throughout.

Though the street architecture of Victoria is not particularly ambitious or interesting, her churches, though more pretentious, are scarcely more successful efforts in design; the R. C. Church is of considerable dimensions and bears evidence that its author had a general acquaintance with a certain phase of modern Gothic, but that he was not intimate with ancient work, the conventional foliage, the moldings and details generally being the rocks upon which he suffered pretty complete shipwreck. An extraordinary edifice in an exaggerated form of the "rock faced" mania, with tin pinnacled buttresses and a roof the grouping of which baffles all efforts to elucidate, is the proud possession of the Methodists. The Anglican Cathedral is an uncompromising box with the all too customary hollow buttresses of "rustic" and a square tower with parapet, all of the same hopeless style; the interior though a modern travesty of a stone construction, has a certain ecclesiastical feeling which is heightened by a good stained East window and a pulpit rail and reredos in oak too evidently new and too good for the building.

That a small town which until very recent years was in a singularly isolated position should possess so much building of a somewhat perfunctory description is not very surprising, and with increased prosperity, great, possibly very great, improvements may be confidently augured. The indifferent materials with which the earlier builders had to work must be accepted as being largely responsible for many shortcomings; bricks no longer require to be painted that they may be weather-proof and fine building stone is now easily obtained at a fair price; steel and iron are not as formerly almost prohibitive in cost: in every direction may be found greater facilities and lower prices, which, together with a demand for sounder methods created by the knowledge of what is being done in other places near at hand will quickly bring about better results.

But it is in her residential and suburban architecture that Victoria shows to best advantage, and it is a pleasant change to leave the business portion of the town and wander along the roads with their oak trees and wild roses, the bracken and the broom growing luxuriantly up to the very macadam. There are to be found many charmingly designed houses with a home-like, cosy air about them, that is really delightful; the close cropped bright green lawns, the well grown hollies, birches, poplars and spreading oaks, the laurels, box hedges, roses, and the wandering, rambling dark green ivy, all combine to create a resemblance to English houses so often claimed for many Victoria homes; as there is perhaps nothing so altogether enchanting as a certain type of English Country House, this is no small praise; better still, it is not altogether undeserved.

Victoria's gardens and the fine panoramic view of the Straights del Fuca and the Olympian Range are her great glories, and indeed neither the gardens nor the view are easily excelled anywhere; the pleasant equable climate too, makes it possible to enjoy both of these advantages to the fullest extent. Moreover the country round about, which is a capital mixture of cultivated and virgin land, is well intersected with roads; perhaps it is but natural that the Victorians should a little neglect the "City" for the outskirts, the attractions of the latter being duly considered.

Though many of the better houses are designed on English lines with red roofs well gabled, and upper stories and gable ends pannelled in a more or less happy imitation of half timber, there are also some very refined examples of American picturesque;—two houses on Rockland Avenue being perhaps the best; they are executed in shingles, are subdued in color and the lines are simple and dignified, relief being afforded by admirable fenestration; the porte cochere in one instance is piquancy itself.

There is a tendency to utilize the rough-cast and half timber effect without restraint and without breadth, a tendency which at times degenerates into positive meaninglessness; there are not a few instances where weather boards have been pannelled to represent half timbering by means of dark painted 1 x 6 framing planted on them; such poor subterfuges cannot be too strongly condemned for they are not even successful as shams; it may be frankly conceded that it is doubtful taste to imitate the old half timber construction by framing panels on rough lining and filling in the spaces with roughcast, still the effect is there when cleverly applied and with feeling, and viewed through the dark green foliage of the oaks is most pleasing.

Many houses have good square halls with brick fireplaces which harmonize well with the dark brown tones of the pannelled cedar wainscots and beamed ceilings. Cedar is very freely used in the interior fittings and the plaster walls and ceilings (where not pannelled) are usually kalsomined—indeed both cedar and kalsomine are so much in evidence one is tempted to conclude that there really can be too much of a good thing, especially when it excludes other modes of decoration. Surely in these days of Norris & Dresser wall papers, Voysey, Sedding and Crane friezes, dados and ceilings, place might be found for one or another of the many charming color schemes and all our patterns that can be procured at an expense which is slight compared with the cost of the simplest pannelling.

Here, as elsewhere, novelty is too frequently and evidently striven after with the usual results,—strained effects, exaggerations and lack of repose; why should so many gables, which as plain honest gables would be pleasing enough, suffer from violent irruptions of cut and fancy shingles, turnings, fretwork, brackets, finials overladen with detail, setting sun panels, and what not? All these could be discarded to the advantage of the client's pocket, to the infinite gain of the design (which is injuriously affected not enhanced by all this rubbish) and also to the architect himself, by impelling him to more truthful modes of expression, to say nothing of the poor but honest critic who is frequently driven to desperation by the endless repetition of these errors in elementary good taste.

Domestic building in British Columbia is universally executed in timber and that medium will long continue to be principally employed; it has been declared that there can be no such thing as a timber architecture in the higher sense, which may be more or less true, but whoever propounded that theory certainly never intended that it should be inferred that design in timber should be confined to imitating the features of a nobler order. Timber buildings should bear their origin and construction on their faces in the unmistakable manner that stone and brick structures bear theirs'. When we have had to design in a distinctive manner for the material the above statement may be successfully challenged: at present we are in Jackdaw with-borrowed-feather-stage, the tendency on the part of the Jackaw to moult, the moulting and the rather bedraggled fine plumes producing a truly lamentable result; doubtless the peacock's feathers are sometimes very cleverly applied, nevertheless Jack in his honest coat of sober hue, his pearly grey necktie, together with a sturdy form, strong bill and clear bright eye, is a picture, rustic if you please, but cheerful, self-contained and dignified enough, too.

We look to you, Mr. Editor, to support our plea for greater attention to breadth and simplicity of design, for long lines, wide gables, deep projections and consequently good grouping and fine contrasts of light and shade, plenty of good plain surface; help it to be understood that one carefully drawn moulding, one feelingly profiled turning is better ornament than the most ingenious agglomeration of ill designed detail, and some of the worst features of our timber architecture will become discredited.

MODERN SYSTEMS OF INTERIOR WIRING.*

By L. B. Chubbuck.

Fortunately, in this climate the small amount of moisture in the atmosphere has practically no effect on inside wiring, though in foggy districts near the sea coast, and especially in England, a great deal of trouble is experienced from grounds caused by a film of moisture forming over the surface of the fittings. In regard to wires imbedded in plaster, the effect on the insulation is uncertain, depending on the composition of the plaster and the covering on the wire. In some cases the alkalies in the plaster soon break down all insulation on the wire, while there are many instances of specimens of wire testing well after being imbedded in plaster for many years.

To prevent any liability of leakage or chemical action on the wire, it is now supported throughout on porcelain knobs or cleats, and where passing through timber or plaster is surrounded by a porcelain tube. In Fig. 1 is shown a sketch of this method of

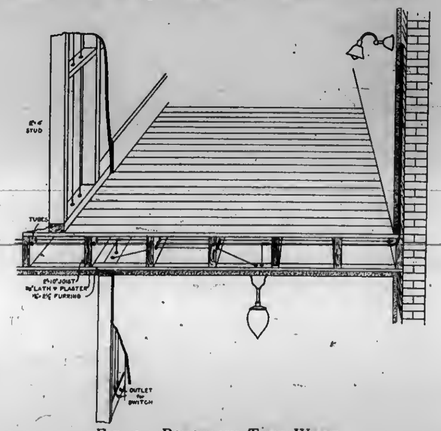


FIG. 1.—PORCELAIN TUBE WORK.

wiring as installed in the ordinary style of building. As may be seen from the figure, there is considerable open space in the partition walls, under floors, and in many cases on the outer brick walls, in which the wiring may be concealed. The joists, studding, etc., are bored to receive the porcelain tubes, and the wires run through these tubes, which are made in different sizes and lengths, depending on the size of the wire and the thickness of the timber they are to pass through. The wiring of the building is most readily done while the building is under construction and before the lathing and plastering is commenced. In finished buildings, where the wiring is to be concealed, the problem is more complicated, and to avoid breaking the plaster, a number of devices are used by different contractors. In passing down the partition walls the best work is done by using bits with shanks that can be lengthened to twelve feet or more, and boring through

* Abstract of paper read before the Engineering Society of the School of Practical Science, Toronto, and published by permission.

all obstructions in the partition from top to bottom. In passing down the narrow space between the lathing and brick work on outer walls, what is technically termed a "mouse" is used, consisting of a short chain fastened to the end of a cord. This is dropped down the wall and fished out from below; the wires are then drawn up to the outlet in flexible conduit. In order to conceal the wiring under the floors, some of the flooring is taken up, preferably by carpenters, although in small jobs this work is generally done by the electrician himself. Where thick, gummy flooring is encountered, this is a most laborious operation with a hand saw, and a small circular saw is often used to much advantage. The writer has seen a combination of one of these saws geared to a small iron clad motor used for this work, which answered the purpose perfectly. Both saw and motor were mounted on a light wooden frame, by which the saw was moved ahead as the cutting proceeded. The connection to the motor was made by a long twin wire to the mains in the basement.

When it is considered too troublesome or expensive to conceal the wiring in a finished building by lifting floors, etc., the wires are often run in wooden mouldings to diminish the unsightliness of open wires across the ceilings or walls. This class of work is much used on steamboats and is especially adapted to wiring panelled rooms, as the moulding may be made to match the woodwork of the room. Considered from an electrical rather than the decorative standpoint, wiring imbedded in moulding is inferior to wiring supported on porcelain and freely surrounded by air. The dissipation of heat is more easily effected in the latter case than in the former, and in a damp place the moulding will cause leakage, as wet wood is a conductor rather than an insulator. A case was met with recently where a No. 8 wire under the action of electrolysis had been entirely wasted away to a green trace of copper salts, by being imbedded in moulding,

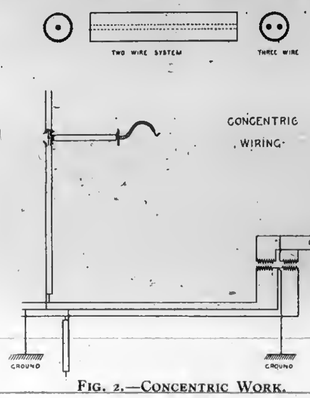


FIG. 2.—CONCENTRIC WORK.

which had been soaked by a break in an adjoining water pipe. In practice the use of moulding is confined to work which is in full view and quite dry, and is not allowed in concealed work, such as between floors and ceilings, because of uncertainty as to dampness.

A method of wiring especially adapted to fireproof buildings, and known as the concentric system, is used to a great extent in England and Germany, though not yet in America. In this system, as illustrated in Fig. 2, instead of using two separate wires, one conductor is enclosed inside of an outer armor, which is used as the other conductor. The inner conductor is a tinned copper wire, which is surrounded with vulcanized rubber, taped and bedded with jute. Over all is bound a layer of galvanized iron wires twisted spirally, forming a complete tube about the inner conductor, and having a conductivity equal to it. For three-wire work, there are two inner conductors, insulated from each other, and from the outer covering, which in this case is used as the middle wire of the system. In both the two and three wire work this outer armor is grounded where the mains enter the building, and at different points along the wiring, if the stretches are long. A case may occur where the terminals of two separate concentrics which are on long circuits come a short distance apart. If one of these cables is fully loaded while the other is idle, there may be a "drop" of 2% on the loaded cable to no "drop" at all on the other, which will cause a difference of potential of 1% between the outers at the ends of the two cables. This under certain conditions is sufficient to set up electrolysis, which in time would destroy the covering of one or both cables unless they are both well grounded at these ends. For alternating current work, unless for short runs, both conductors must be run in the outer covering, as in the case of a single conductor in an outer iron armor, the drop along the line will be increased by impedance due to the alternating current.

The advantages of the concentric system are, that there is practically only one wire to run, and this may be buried in plaster or run over iron work with impunity. The cable itself also is quite small, being for a No. 12 wire only $\frac{5}{16}$ in. in diameter, and as no insulators are required it is very easily concealed. Since it is armored, it is unaffected by nails, etc., and in case of any rough usage, such as the rupture of the cable by a chisel, a dead short-circuit is formed, which blows the fuse immediately, without any arc being formed external to the cable. The adherents of this system claim, like Mark Twain, that it is best to put all your eggs in one basket and then "watch that basket." They argue that it is better to put all the insulation on one conductor, and to see that this insulation is well protected, than to have two conductors, each liable to a breakdown. The disadvantages of this system are, first, the obvious difficulty in making the joints, and, second, having the outer grounded, which is a disputed question. This system is used chiefly in isolated plants or in buildings using alternating current and supplied from separate transformers, as there would probably be considerable electrolysis of gas and water mains where there was a network of bare outer conductors all over a city.

The concentric system is not used in America, and in the modern type of fireproof buildings, having brick partitions and floors of brick arches across the steel floor beams, the frail system of wiring on porcelain knobs is unsuitable. There is usually no free space along the floors or in the walls for running the wires, and even if there were such a space, the chances are great that falling mortar or brick would either break the wires or ground them on the steel frame work. To provide protection and accessibility to the wiring in such buildings, the conduit systems have been evolved. As far back as 1885 there are instances of wiring on some steamers being run in small brass pipes. The inside of the pipes was smooth, and as the runs were not long, the flexible cord used was easily threaded through the pipe from one opening to the next. Speaking tubes were tried about this time to act as a channel for the wires, but it was found that the conductors could not be inserted or withdrawn freely, and speaking tubes for this purpose were discarded. Since that time there has been very largely used a tube of papier mache, impregnated with a bituminous compound, to render it impervious to moisture and also to increase its insulation. It was found, however, that when this "plain conduit" was concealed in plaster, it was ultimately destroyed by chemical action. Another form of conduit, called circular loom or flexible conduit, is now used extensively. The inner portion consists of a tube formed by a strip of treated paper wound in a spiral; over this is a braided covering coated on the outside with flakes of mica. Though the inner tube is rather inflammable, the outer tube will withstand quite a flame for some time.

The next step was to cover the plain papier mache tube with a thin brass sheath having a longitudinal seam. This brass armored conduit was thought at one time to be near perfection, but even it was found to have its faults. It withstands chemical action to some extent, but is not completely waterproof, and, like all the preceding forms of conduit, it is very susceptible to mechanical injury. Much of the trouble with brass armored conduit has been due to the poor manner in which it was installed, as moisture entering at the outlets or at poor joints is absorbed by the inner lining, which in time will ground the wires on the outer covering.

Several tests were made in the school laboratories on both the circular loom and brass armored conduit, to determine their insulation under the presence of moisture. These tests were made by the condenser method in connection with an electrostatic voltmeter. It was found that in the case of the circular loom, though of fairly high insulation when dry, the insulation resistance fell off very rapidly under the presence of much moisture. The brass armored conduit tested well when dry, and also with moisture for a short time. When exposed, however, to damp for some time, especially if the armor was defective, the insulation fell off, the effect of grounding being more noticeable in the case of the brass armored conduit than with the circular loom, on account of the metal covering.

For absolute mechanical and moisture protection, the iron armored conduit is now used. It has been made with insulating linings of paper, wood, rubber, cement, enamel and asphaltic compound. The metal tube should be the minimum of metal for strength and rigidity, and the lining, besides being capable of

bending with the pipe without cracking or splitting, must be impervious to heat and moisture. There has been much discussion as to whether an insulating lining is necessary in a metal pipe which is perfectly waterproof and the wires it contains are insulated up to many megohms per mile. At the World's Fair (1892) all forms of pipe tubing and conduit then manufactured were rejected, and plain iron pipe was finally adopted, in which the distribution wires were run. Although some of these wires were carrying a 2,000-volt alternating current, no faults whatever were developed. There are also thousands of miles of plain iron pipe now used for underground service for high potential mains in cities, which have given perfect satisfaction.

In spite of these facts, a thin insulating lining is always used for interior conduit work, for several reasons. All the iron pipe as now manufactured on a large scale is very rough on its interior, due to burrs, fins and splinters, and in pulling a wire through a long stretch of this pipe the insulation is very liable to be torn, especially in rounding corners, elbows, etc., in the smaller sizes of pipe. A plain iron pipe is also liable to sweat internally, and any rust due to moisture in the conduit is a menace to the insulation on the wire. Thus a thin lining is useful as tending to preserve both the pipe and the insulation.

There are two styles of iron armored conduit very extensively used, one having a lining of treated paper and the other a thin coating of enamel both inside and outside. The lining in the latter conduit is very hard and as smooth as glass, which is an advantage in inserting the wires. These iron armored conduits are manufactured in the regular gas pipe sizes externally, and in coupling the standard gas pipe threads are also used.

DISTRIBUTION.

The system of distribution to be used in a building depends to a large extent on the character of the building, whether the lights are scattered, as in the case of a business block, or arranged in groups in a large electrolier, around the stage, etc., as in the case of a theatre. One of the most general methods of distribution is shown in Fig. 3, which gives an isometric sketch of the feeder system in one wing of a modern office building. In this system of wiring all the branch circuits (not shown) on each floor are run from one or more distribution boxes or cabinets on that floor. The panel boards in these cabinets are supplied from the switchboard in the basement by a system of risers or feeders running up one of the side walls to the cabinets. In conduit work a two-wire system is usually employed throughout the building, and a separate pair of feeders run up from the switch-board to each distribution box. Or where the load is light, and separate control for each floor from the basement is not required, the panel boards on two or three adjacent floors are supplied from one pair of feeders. In order that the public lights along the halls, staircases and elevators may be independent of the other lights in the building, it is customary to run a pair of feeders from the basement to one or more separate panel-boards on certain floors from which these lights are wired. In case current is required for running motors for printing presses, etc., on some of the floors, the main panel boards on these floors are divided into two sections, one part for the lighting and the other for power service. This power section of the panel board is supplied by separate feeders from the power panel of the switch-board, from which are also run the mains for the elevator motors.

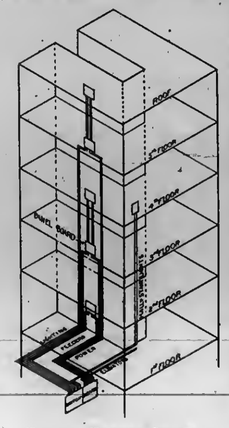


FIG. 3.—FEEDER SYSTEM.

Where ventilating motors are used in a building, they are usually placed immediately under the roof and wired from the power panel in the top floor. To start or reverse these from the basement, a magnetic switch is often placed in the branch circuit to the motor, and the four small controlling wires from this switch run to the basement in one conduit. By the use of these automatic switches, motors, lights, etc., may be controlled from distant points without the expense of divetting the heavy main wires. They can be used in controlling dummy waiters from different floors, and also as the ordinary three and four point switches in lighting an electrolier from several different places. Where the building is to be wired for electric bell, telephone or ticker service, weatherproof wire is generally used throughout for this purpose, and all the wires from each floor run in a single conduit to a distribution box in the basement.

INSTALLATION.

In Figs. 4 to 11 are shown details of different parts of conduit electric wiring as installed in a fireproof office building. The

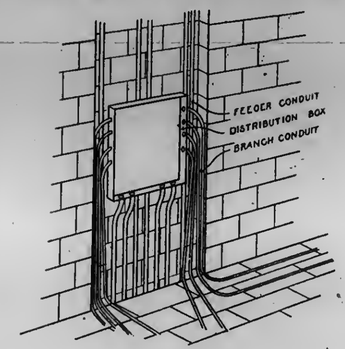


FIG. 4.—WIRE WAY.

conduit is installed at that stage in the construction of the building after the brickwork in the flooring and walls is finished, but before any plastering is started. Since even the smallest size of conduit (⅜") is generally too large to be covered by the layer of plaster on the brick walls, it is necessary to cut shallow channels in the brickwork wherever the conduit is to run on these walls. This is a tedious job, and is usually done by a gang of men with hammers and cold chisels before the regular conduit work is started. Where there are a number of vertical feeders requiring large conduit to be run, arrangements are made with the architect to have a recess left in the brickwork of sufficient width and one brick deep from the basement right up to the roof. A good place to run this channel for the feeders is up the elevator enclosure. This is generally in a central location, which is convenient for the panel boards, and besides this there are no windows, partitions, walls, etc., to dodge around in running the feeders to the basement. Fig. 4 shows the manner in which the feeder conduits are run in the wire way and their connection to the distribution box, also the smaller branch conduits leading from the box to the different circuits.

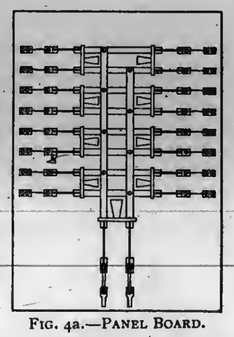


FIG. 4a.—PANEL BOARD.

On account of the large size of wire used for the feeders, a separate couduit is generally run for each wire. If, however, an alternating current is to be used in the building, this arrangement of one conductor in an iron tube will cause a loss of energy by induced currents set up in the iron. It is thus necessary to use brass armored conduit or to neutralize this effect by running both wires in the one tube.

In the branch circuits two wires or a twin wire are almost always run to a single conduit, and the wiring differs in some respects

FIG. 5.—ORDINARY WIRING.

from ordinary methods. In ordinary work, where a number of lights are installed in a room, the mains are run down the length of the room and branches tapped off to each lamp, as shown in Fig. 5. In conduit work, however, no tees are placed on the conduit, and a zig-zag path is taken from one outlet to the next. In

afterwards inserting the wires they are run to the furthest outlet, and, working back, a loop is left at each of the other outlets, to

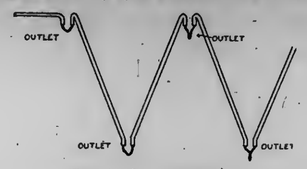


FIG. 6.—LOOP SYSTEM.

which the wires from the fixture are connected. Thus in this "loop system" (Fig. 6) the branch wires are not cut at any place between the panel board and the furthest outlet, so that if larger wires are afterwards required, the different fixtures may be disconnected, the old wires pulled out from end to end, and the larger wires inserted.

Some details of the conduit work on branch circuits are shown n Figs. 7 and 8. It will be noticed that the conduit is run on the

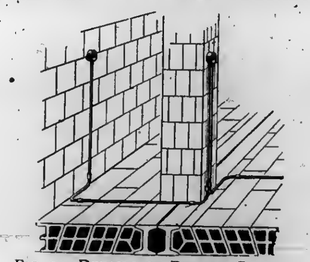


FIG. 7.—DETAILS OF BRANCH CIRCUITS.

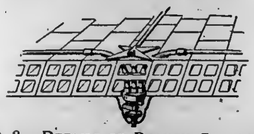


FIG. 8.—DETAILS OF BRANCH CIRCUITS.

brick flooring and not across the ceilings. This is because the plaster on the ceilings is not thick enough to cover the iron armored conduit, and since the brick flooring is afterwards covered by two to four inches of cinders, over which asphalt or the floor boards are laid, the tubes are completely concealed. In both these figures outlet boxes are used, into which the ends of the conduit at the outlet are sealed. These outlet boxes are made of iron, with a lining of the same material as that used in the conduit. Two common forms are shown in Figs. 9 and 10, the first of

FIG. 9.—OUTLET BOX.

FIG. 10.—OUTLET BOX.

which is an outlet box shaped to act as a receptacle for a flush switch. Fig. 10 gives a form used at a bracket outlet, showing the nipple on the cover by which the bracket is supported. In many buildings, however, outlet boxes are not used, especially for bracket and ceiling lights, the conduit being trimmed off nearly flush with the plaster and the fixture connected up in the usual manner. When one or more branches are to be tapped off the mains for an electrolier, etc., a "junction box" is used. These are very similar to outlet boxes and often contain a branch cut out, making them practically a distribution box on a small scale

The wiring in the basement is usually run open, i.e., not concealed in the plaster, and is often run in flexible conduit or on porcelain knobs, though for fireproof work the iron armored conduit is continued to the switchboard. A very useful support, made from gas pipe, for carrying the conduit in the basement is shown in the upper portion of Fig. 11. This figure also shows a form of switchboard suited to the feeder system in Fig. 3, each pair of feeders being controlled by a double pole switch.

It is not permitted when installing the conduit to run cords in the stretches as they are put up, to facilitate pulling the conductors through afterwards, as this might make poor construction possible; that is, it would be an easy matter to pull even large wire through a conduit having rough, poorly made joints, which would abrade the insulation on the wire. When the wire is run through the conduit properly, it is practically a guarantee that the conduit has been well installed or the conductors could not be inserted. For this same reason, it is important to have all necessary curves as gradual as possible or difficulty will be had in running the wire afterwards. In making a correct joint in iron armored conduit, a wheel pipe cutter is used to cut merely through the outer iron armor, a hack-saw being used to saw through the lining. A reamer is then used to trim up the end of the conduit before it is threaded. A jack-knife is often used instead of the reamer, but a poor job is generally the result. Care should also be taken that the white lead used in sealing the joint does not get between the ends of the conduit. This can be prevented by giving the coupling a turn or two on the condnit, and then applying the lead to the thread on the outside of the conduit.

The actual wiring of the building by running the conductors through the conduit is not done till all the plastering, flooring,

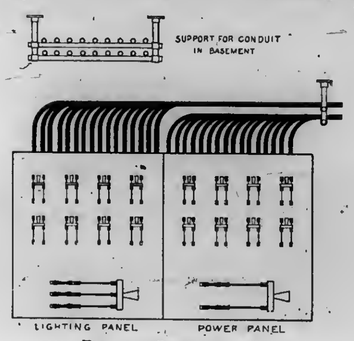


FIG. 11.—SWITCHBOARD.

etc., is over and the building is nearly finished—in fact, the wires are often run and the fixture work done at the same time.

There is not much difficulty in running the risers or feeders, as the conduit is large, and the wire, where larger than No.6, is generally a stranded conductor: On the horizontal branch circuits, however, with many turns and using twin wire, the problem is not so simple. The inside surface of the conduit is first rendered smooth by blowing some powdered soapstone out of a horn through a section of the conduit. A steel tape about $\frac{3}{16}$" wide and as thick as a clock spring is then passed through the conduit, after which the wires may be run. The tape is always run downwards if possible from a higher to a lower outlet. An ordinary stretch for a run is from fifty to eighty feet with three or four turns, though it is sometimes possible to thread the steel tape nearly two hundred feet on a horizontal run.

In conclusion, it may be stated, that on account of the high standard of insulation now used on wire, any system of wiring is practically perfect where the insulation is protected from mechanical and chemical injury. The system to be employed in any special case depends on the circumstances. In some cases one system may be perfect, while in others it is expensive and unnecessary. In the best practice iron armored conduit is used in fireproof buildings or where the wiring is embedded in plaster or brick work. For the ordinary class of buildings with wooden joists, etc., where there is no liability of mechanical abuse, porcelain work is perhaps as good a system as can be used. In any case, where the wiring is properly done, the incandescent electric light—in contrast to the explosive and poisonous character of ordinary lighting gas—is probably the safest method of illumination yet devised by man.

ILLUSTRATIONS.

MR. MACLURE'S BUNGALOW, VICTORIA, B.C.—S. MACLURE, ARCHITECT.

BANK OF COMMERCE, WINNIPEG, MAN.—DARLING & PEARSON, ARCHITECTS.

ENTRANCE STAIRCASE, TEMPLE BUILDING, TORONTO—GEO. W. GOUINLOCK, ARCHITECT.

RESIDENCE FOR MR. JAMES JERMYN, ROSEDALE, TORONTO—A. FRANK WICKSON, ARCHITECT.

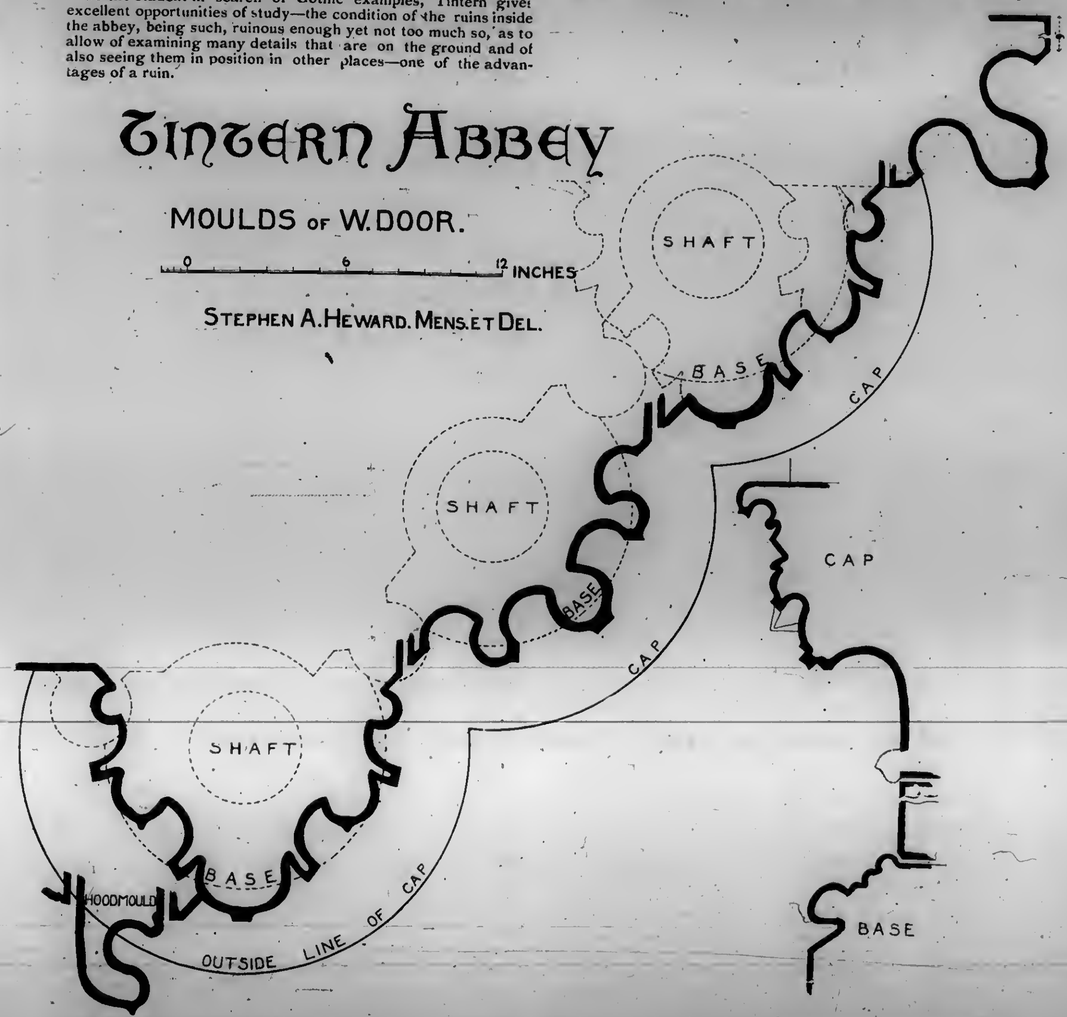
STUDY FOR BUSINESS PREMISES, WITH DWELLING ABOVE—ROBT. M. FRIPP, F.R.I.B.A., ARCHITECT.

RESIDENCE OF LORD MOUNT STRPHEN, SHERBROOKE STREET, MONTREAL—W. T. THOMAS, ARCHITECT.

TINTERN ABBEY, WEST DOOR—MEASURED DRAWINGS BY STEPHEN A. HEWARD.

Tintern Abbey is in Monmouthshire, and is of easy access from Bristol or Clifton across the Channel.

To the student in search of Gothic examples, Tintern gives excellent opportunities of study—the condition of the ruins inside the abbey, being such, ruinous enough yet not too much so, as to allow of examining many details that are on the ground and of also seeing them in position in other places—one of the advantages of a ruin.



The West Door, the subject illustrated in this number is a fine specimen of 13th century work.

PARLIAMENT LIBRARY BUILDING, OTTAWA—MESSRS. FULLER & JONES, STENT & LAVER, AND THOMAS FULLER, ARCHITECTS.

Although usually spoken of as a separate building, it forms part of the Parliament building. It was included in the original design for which Mr. Fuller received the first premium in 1859, and the building as completed conforms closely to the original design. Construction was commenced in 1860, but when the buildings were occupied in 1866 the library walls were covered in above the lean-to. In 1868 the construction was resumed, but it was not until 1877 that the building was completed and fitted up for occupation.

The building consists of a dome surmounted by a lantern and surrounded by a lean-to aisle. Internally the dome is circular, but externally both it and the aisle are 16 sided. At each external angle of the building is a flying buttress to resist the thrust of the vaulting originally designed to be of stone, but which idea was subsequently abandoned and a plastered ceiling simulating the interlacing ribs of the original design substituted.

The inside diameter of the dome is 87 ft. 6 inches, and its height 140 ft.; the outside diameter of the building, 127 ft. exclusive of buttresses, but 146 ft. inclusive of buttresses.

The walling is of local limestone faced with local sandstone and the dressings of sandstone from Ohio, excepting the voussoirs of the flying buttresses, which are of heavy bedded local limestone. The roof and lantern have iron principals, wooden rafters and wooden roof boards covered with copper. The inside walls and dome are plastered.

In the circular interior wall of the dome is a door corresponding to each side of the outer wall, one of which doors leads into the Parliament House, one to an external entrance, and the others to the rooms into which the leanto is divided. Against the circular wall of the dome are three stories of bookcases with returns in wards towards the centre at each door, leaving a radial passage on floor and each gallery. All the bookcases and galleries are of white pine, the gallery floors ground glass, and the railings wrought iron. The woodwork ir elaborately carved in floral designs. The flooring of the dome is in Canadian woods.

In the centre of the floor space is a pedestal supporting a marble statue of Her Majesty the Queen.

The dome receives its day light through large clerestory windows and from the lantern; by night incandescent electric light is used.

The heating is indirect from stacks of steampipes in a cruciform passage which divides the basement plan into quadrants. This passage is directly over subterranean air ducts leading from the face of the cliff and the fresh air therefrom when warmed by the steam coils passes up through the floor in large tubes terminating several feet above the floor line in brass registers.

COMPETITIVE DESIGN FOR SEAL FOR O.S.A., BY MR. GUSTAV HAHN, AWARDED FIRST POSITION.

THE ONTARIO SOCIETY OF ARTISTS' 27TH EXHIBITION.

THE statement has been made that the thing which exists, and that can look back on years of existence, is worthy of respectful attention. On this simple ground the Ontario Society of Artists may legitimately demand an initial recognition that will be freely accorded by the unprejudiced. The present is its 27th spring exhibition. Looking back over the intervening period between this and that of ten years ago it is pleasing to be able to note that there has been a gradually increasing excellence, which is all the more praiseworthy when the lean years of the last decade are taken into consideration. To the continuance in being of the O.S.A. there has been contributed much of self-repression, much of endurance, much genuine love of art and much earnest manful and womanful endeavor. No doubt during that time the Society has had its acerbities and its feuds. At the same time there have been sterling comradeship, and an amount of subordination of the individual to the general that have largely contributed to the welfare of the institution. When we think of the sensitiveness of artists, and of the way in which that sensitiveness is often needlessly outraged; of the difficulty of getting the artistic temperament to "go in harness"—so to speak—at all, we must acknowledge that the O.S.A. may look with some complacency on its twenty-seven years' record.

It is a mistake to look at any exhibition of art in a spirit of sectarian narrowness. As well might a man looking at a landscape admire only one sort of tree or one kind of flower. Art is a product of human nature, and human nature is very various. One gets a good deal more pleasure out of life by being able to admire a great many types of human beings, and the principle may well be applied to pictures. In looking at a picture, we wish to adjust ourselves to the factors of the case, and then to judge of the work produced. Another principle which has to be borne in mind is that of evolution. It is no more use to try to shut evolution out of art, and poetry, and even religion, than it is to shut the march of the seasons out of Ontario. Unnatural and bizarre effects are revolutionary rather than evolutionary. They may surprise, but they do not convince. At the same time, a few earthquakes and comets and cataclysms do not matter, especially as we generally know how the effects are produced—how many pounds of dynamite are used in the earthquake, and how much lime and oxyhydrogen gas it takes to "work" the comet across the stage. The path of progress in art is the good old path of evolution, let those climb by means of balloons and strange Daedalic flying machines who will.

But it is time to say something about the pictures.

Place aux Dames: The women painters who are represented here are:

M. E. Dignam.	A. Hime.	S. S. Tully.
E. Douglass.	M. H. Holmsted.	C. Vanden-Broeck.
E. Elliott.	L. Muntz.	H. M. Vickers.
C. E. Galbraith.	M. H. Reid.	E. Windeat.
C. S. Hagarty.	G. E. Spurr.	M. E. Wrinch.
W. D. Hawley.		

The men are:

C. Ahrens.	R. F. Gagen.	L. R. O'Brien.
W. E. Atkinson.	J. S. Gordon.	S. Pendleton.
F. S. Baker.	E. W. Grier.	J. A. Radford.
J. W. Beatty.	G. Hahn.	G. A. Reid.
F. M. Bell-Smith.	S. A. Heward.	W. Robins.
W. D. Blatchly.	F. McG. Knowles.	J. T. Rolph.
F. H. Brigden.	J. E. Laughlin.	W. A. Sherwood.
J. A. Browne.	H. Martin.	W. St. Thomas Smith
P. F. Brownell.	T. M. Martin.	H. Spiers.
F. S. Challener.	C. M. Manly.	O. Staples.
J. C. Forbes.	M. Matthews.	E. S. Thompson.
J. W. L. Forster.	E. M. Morris.	J. Willson.
E. Fosberry.	C. E. Moss.	

Here then we have the selected work of no fewer than fifty-four artists, and it is understood that this year the committee on whom the selection devolved, exercising their function by systematic voting, lived up to their responsibilities and rejected rather more than they accepted. They are deserving of the thanks of the public and of the artists whose works they "turned down." Disagreeable as it is to have one's picture rejected, it is no worse a fate than is continually happening to literary people in the rejection of their manuscripts, and there is no progress but by the survival of the fittest. The result is, in this instance, an exhibition which is a credit to Ontario and to Canada, and which would not disgrace any city on the continent. It is interesting to note that of the fifty-four artists represented, forty-three belong to Toronto and the neighborhood, three to Ottawa, one to Ithaca, N.Y.; two to Hamilton, one to Dundas, one to Lennoxville, Que.; one to St. Thomas, one to London and one to New York. Although this classification denotes that Toronto is becoming a very important art centre, it would certainly be pleasing to see the Province of Ontario at large a little better represented.

In these brief notes of this excellent exhibition it is impossible to refer critically to every picture, but, generally speaking, the artists whose pictures are here may be divided into two classes: those who have arrived and those who are arriving. Of course the pitch of excellence at which the first have arrived and which the second are aiming at varies considerably, and there are some who will never arrive at anything particular. Again, parenthetically, we may say that these two broad classes may be divided into those who venture to paint figures of human beings or animals, and those who do not, and we count the ability to paint figures a very important distinction, because it generally shows that the artist who attacks the figure can draw, while the other one, to a great extent, cannot.

Now, we should say that the President, Mr. Reid, has "arrived," and that so has Mrs. Reid, and Mr. O'Brien, and Mr. Bell-Smith, and Mr. Atkinson, and Mr. Manly, and Mr. T. M. Martin, and Mr. Wm. St. T. Smith, and Mr. Rolph, and Mr. Gustav Hahn, and Mr. Grier, and Miss Gertrude E. Spurr, and Miss S. S. Tully, and several others. They have mastered their materials and know what their hands can do with them. In the works of some, as in the Reids, in Mr. O'Brien, in Mr. W. St. T. Smith, for instance, there is the exemplification in their works of considerable poetic insight into nature—they are painter-poets so to speak; for in art as in literature there are the Platonists and the Aristolelians. But, in addition to this, there is a certain sureness of touch which is essentially characteristic of the "arrived" artists. Look for example at Mr. Reid's decorative panel "Summer," a reproduction of which is annexed, and we at once see that there is a balance, a conscious strength, a dignity about it which mark a very high pitch of artistic achievement. There is no striving for effect, because there is no necessity for it. Similarly in Mr. F. M. Bell-Smith's "Stoney Indian Camp, near Canmore, N. W.T.," though the work lacks the imagination and invention that we find in Reid's panel, it depicts nature with a considerable amount of masterly handling, and with a keen perception of what paint and brushes can be made to do, and these come only by long experience and severe study. All the Northwest pictures in the show, by the way, are the work of "arrivees:" T. Morver Martin's "The Asulkan Glacier, B.C." is no work of the flux period of the artist; it is certainly one of the best of that mountain region that he has produced, nor is Matthews' fine water-color "The Canyon at Evening," nor Bell-Smith's finest picture in the Exhibition, "The Heart of the Selkirks." Again, as fine examples of the "arrived" period, take any of Mr. C. M. Manly's. His "World of Heather,"

"RACHEL'S TOMB, BETHLEHEM."—F. S. CHALLENER, A.R.C.A.

his "The Creeping Mists Came in," and his "The Silver Thread of Jerson," show a mature capacity in that style of work which is always delightful. Or look at Rolph's "A Hillside at Weston," and you have a perfect example of Rolph, one of the Rolphiest Rolphs we have ever seen. And in "Evening in the Barbican, Plymouth," we have one of the Smithiest of W. Smith's. It is just this quality of individuality, this adult characterism, this signed-all-over quality, that marks what we have ventured to call the "arrival" period. Of course those who have come to this stage—some earlier and some later—may please us from year to year with new combinations—the world is great and there are endless subjects and ways of treating them.

It seems strange not to put Mr. McGillivray Knowles into this category, but for the reason that he is such an adventurous voyager, turning his prow now here and now there, we must put him in the other. His boast is well-found. Dropping the metaphor, Mr. Knowles can draw, he is a great colourist, and he sees things. His striking picture of Psyche, which occupies

"PSYCHE."—F. MCG. KNOWLES.

the place of honor in the exhibition this year, is one of the sort of pictures that lift an exhibition out of mediocrity, and as a beautiful work of art it has had few rivals on these walls. The little nude "A Woodland Nymph" also does him much credit, while the "Bit on the Thames" shows the versatility and vitality of this accomplished artist. Miss Laura Muntz is another adventurous voyager in whose prowess one cannot but rejoice. Her pictures live. Those who remember her work a few years ago will acknowledge with pleasure a considerable increase of power. A little more restraint will come later, now she riots in strength and vitality. Her "Mussell Gathering," and her "Lullaby," are in our humble opinion the cleverest TOURS DE FORCE in the show. Miss Clara Hagarty has force that struggles with conventionalism and discipleship; her two fine portraits, however show a considerable advance on former work, and a human characterization that gives them distinction; they undoubtedly hold the first place in point of interest among the portraits exhibited. Mr. F. Gagen has made notable progress during the past few years, and his oil-painting "A Calm Summer Afternoon" with its red rocks, its water, its floating clouds and its feeling of heat, is a decided advance on former work. His "Just above High Tide," is also pleasing, and his other four watercolours are meritorious, as are also Mr. W. D. Blatchly's "The Path by the Mill Race" and "Morning Light," on both of which we heartily congratulate him, as they show conspicuous progress. F. S. Challener, has the root of the matter in him, and his pictures are always interesting. His "Rachel's Tomb, Bethlehem" is full of the Eastern atmosphere. His "Conscience Makes Cowards of us all" appears to be a picture with a story, but the story is not immediately apparent. The nude feminine ghost is clever and the accessories satisfactory. Mr. Challener has imagination. Mr. J. Arch.

DECORATIVE PANEL, "SUMMER."—G. A. REID, R.C.A.

Browne's "Clearing," a landscape showing the wind in in autumnal trees is an effective effort and shows considerable strength of handling. Mr. Edmund M. Morris has two pictures one of which, "Landscape," is decidedly attractive as a powerful sketch, showing good colour and considerable dash, the other, "At the Docks," mixed as to colour, and with no regard for composition. We like Mr. Owen Staples' "Hollyhocks" better than we do his "Changing Pasture, the cow broadsideon and taking up so much of the picture, though admirably drawn, is in our opinion hardly up to the artist's pictorial mark.

The water-colours demand a special notice and we are sorry that we have room but for the bearest mention. Mr. F. H. Bridgen is decidedly improving and has several very clever sketches. Mr. J. S. Gordon's "A Tiff," is ambitious and clever. Miss Wilhelmina D. Hawley's "Cold Bath" and "Cleaning Brass" are exceedingly brilliant both in drawing and color.

There are so many pictures in the exhibition that call for notice that we regret very much that the space allotted to us prevents us from doing more than thus noticing a few salient points.

BERNARD MCEVOY.

Mr. William Bryce Mundie, a former resident of Hamilton, Ont., has recently been appointed architect to the Chicago Board of Education.

STUDENTS' DEPARTMENT.

"When we mean to build
We first survey the plot, then draw the model;
And, when we see the figure of the house,
Then must we rate the cost of the erection;
Which, if we find outweighs ability,
What do we then, but draw anew the model
In fewer offices, or, at least desist
To build at all."—Shakspeare.

YOUNG men studying for the profession of architecture will do well to remember that the law has had a good deal to do with architects and their clients in the past and that there are some very important lessons to be drawn from the fact. It is important that an architect should be posted on some particulars at any rate, in order that he may be saved from the consequences of actions that, though they are in themselves insignificant, may give rise to much trouble.

Some men are fortunate in their clients and no one at the outset expects that he will have trouble before his work is completed, but a sudden occasion will sometimes give rise to a serious disagreement and the settlement of accounts may result in alarming lawsuits.

The subject is one worthy a far more lengthy treatment than the limits of this article will allow, but I propose to give a few pointers to young architects and students that may help them to avoid the courts.

First of all, then, if an architect is employed to carry out a building that it will be more than a year before his work in connection with it is finished, he must have a contract in writing with his clients. This is according to the Statute of Frauds. The effect is, that, if at the commencement of an architect's employment it was foreseen that the work he is engaged for would take more than a year to complete and he has no written contract, if a dispute arises between him and his employer the employer can escape from paying for his services and the court cannot but uphold him in his contention. If the employer is a corporation or any body possessing a seal, there must not only be a written contract, but the seal must be attached. The seal is the sign that the whole corporation enters into the contract and not the individual who signs on behalf of the corporation. The fact that a mayor or president signs with the full intention of binding his corporation and that they fully concur in the signing does not count at law if the seal is not attached to the contract.

In the prosecution of an architect's work it sometimes occurs that some other person than the proprietor, his wife, for instance, will give the architect an order for some change of plan or some additional work, and the architect, believing that in pleasing the wife he is satisfying his client, has the work done as requested. When, however, it comes to a settlement of accounts, the architect learns to his mortification that the wife was not the duly authorized agent of the proprietor, and, as she had no authority to give an order, so the architect has no right to carry it out. It matters little that the client benefited by the change and personally enjoyed the improvement. The architect has rendered himself liable for the whole expense. Again, in dealing with the authorized agent of a client, it may be his lawyer or his business manager, it is necessary to have it clearly laid down what is the extent of the agency, what power the agent has to order work or changes. So the architect, as the agent for his client for the particular purpose of his profession, must be careful not to exceed the powers of his agency. That is to say, it should be understood between architect and client what limitations, if any, are to be placed upon the architect in respect to ordering articles as, for example, gas or electric fittings, grates and so on, for it may be the employer concludes he is to have the choosing of such things, and it may be hard for the architect to prove that he had authority to give orders in the face of a determined stand of the client that he never gave such authority. It has, however, been laid down that where the orders given by the architect are "necessary for the carrying out of the work" he has that authority implied by his employment; the point turns on what is "NECESSARY for the carrying out of the work." It will at any rate be worth while to consult the client first.

The architect should never order anything for his client's building in his own name, lest, as has happened, the seller should find it easier to collect from the architect than his client. It is always well to make use of some such sentence as "I am authorized by my client So and So to order, etc., etc.," so that there may be no mistake. Where the employer becomes bankrupt, the architect has had to foot the bill because he omitted to mention that he was ordering for his client, even though it may have been naturally supposed from the circumstances that the architect could not be ordering for his own use.

If a client is disposed to quarrel, he can find occasion easily enough. He discovers that the architect has made some change, perhaps substituting stone for brick, or otherwise made some slight improvement that he thought would be advisable without adding to the cost, which, however, constitutes a variation from the drawings and specifications. If the architect can show no authority for the change he is liable. It has been held "that the power given to the architect by the builder's contract, to order additions and omissions, did not give authority to order VARIATIONS."

The architect being the agent of his client for a special purpose, the client has the right to require of him, not only skillful performance of his agency, but also good faith towards himself. James, L. J., has laid down "that any surreptitious dealing between one principal to a contract and the agent to the other principal is a fraud in equity and entitles the first-named principal to have the contract rescinded and to refuse to proceed with it in any shape." It has also been held "that when a secret gratuity is given to an agent with the intention of influencing his mind in favor of the giver of the gratuity the transaction is fraudulent and the contract void at the option of the other party to the contract." If, on the other hand, the architect, to suit the convenience of the employer, withholds a certificate from a contractor when it is justly due, he may be held liable, individually or jointly with the employer, but the contractor must prove that there has been collusion between the employer and the architect to defraud him.

A contract that binds the employer to pay on the certificate of the architect does not enforce payment if the certificate is granted fraudulently. That is, if the builder has in collusion with the architect presented a certificate that is not honestly due, the owner may refuse payment, but he must establish the charge of fraud against the architect to succeed, and Lord Herschell has said "Fraud is proved when it is shown that a false representation has been made: (1) Knowingly or (2) Without belief in its truth or (3) Recklessly—careless, whether it be false or true." A false statement is not necessarily fraudulent—a false statement may be made in error, in an honest belief that it is truth, and where that is the case it is not fraudulent. An architect may be misled by the statement of the builder and grant a certificate in consequence; it has been held that such action on the part of the architect was not fraudulent.

With regard to plans and specifications an architect cannot be held liable for inaccuracies; he may make mistakes due even to gross negligence, but, unless he wilfully misrepresents and thereby purposely deceives the contractor, he is not liable. The contractor to be relieved from carrying out that for which he has contracted must prove fraud on the architect's part. Serious discrepancies, through negligence, have been found to exist between the drawings and the specifications, certain things shown on the drawings but omitted from the specifications—the contractor, however, is prevented from claiming extra payment by the clause which states that the drawings and specifications together form the contract. In a specification of a house all reference to flooring was omitted. The contractor provided the material because it was shown on the drawings, but refused to lay it without additional charge. Judge Pollock said, in delivering judgment, "that the flooring of a house cannot be considered an extra any more than the doors or windows." "The contract," said Channell, B., "is that the HOUSE should be completed, not that the works hereinbefore mentioned should be completed."

Just a note on "Penalties" and "Liquidated Damages." If the word "penalty" is used for the amount to be forfeited by the contractor if he fails to complete the work within a certain time, it necessitates the employer proving the damage or loss he has sustained: but, if the expression be "liquidated damages," the contractor in default must pay the amount mentioned without further investigation.

I have refrained from citations in the foregoing notes, but, in conclusion, let me say, that every point brought out is the result of an actual lawsuit in each case, and the decisions stand as precedents for all time.

R. W. GAMBIER-BOUSFIELD.

THE CHICAGO SKETCH CLUB.

IF we may judge by the programme of the meetings, the Chicago Architectural Sketch Club is conducted on unique lines. The notice for the meeting on Feb. 27th read as follows:

CONTINUOUS VAUDEVILLE AND DRAMA.
Curtain rises at 8 p.m. sharp. "Chaser" at 12 p.m.
First performance of the roaring Comedy.
"THE NEW DRAUGHTSMAN."
Specially written for the occasion by
MR.————
and presented with marvelous stage settings and gorgeous scenery under the personal direction of the author.
A number of bright and catchy vaudeville "turns" will be put on before and after the drama.
Eatables. Drinkables.

ONTARIO ASSOCIATION OF ARCHITECTS.

THE regular monthly meeting of the Toronto Chapter of the O.A.A. was held on Monday evening, March 13th, in the form of a dinner at McConkey's. Mr. Helliwell, the chairman, was unable to be present through illness, and as Mr. Baker, the vice-Chairman, had the management of the affair on his hands, Mr. Edmund Burke was asked to take the chair, which he did to the satisfaction of all.

After the business of the meeting was disposed of, Mr. J. A. Duff, of the School of Practical Science, was called upon, and responded with an address upon the subject of the value of official tests of building materials, and, as usual, he handled his subject in a masterly manner. He confined his remarks to timbers, and read paragraphs on the subject from the American Government Reports, extending over the last ten years. About the beginning of that period engineers had been impressed with the evident fact that the methods of calculating stresses in timbers employed at that time, the system of employing factors of safety, etc., partook largely of the nature of guess work, owing to the manner of establishing coefficients for the different woods. The specimens upon which tests were made were simply taken from timbers of the different kinds in lumber yards and without considering the age of the tree, locality of growth, nature of soil, time of year cut, etc., etc., and without knowing anything of the stick, except its kind and whether green or dry.

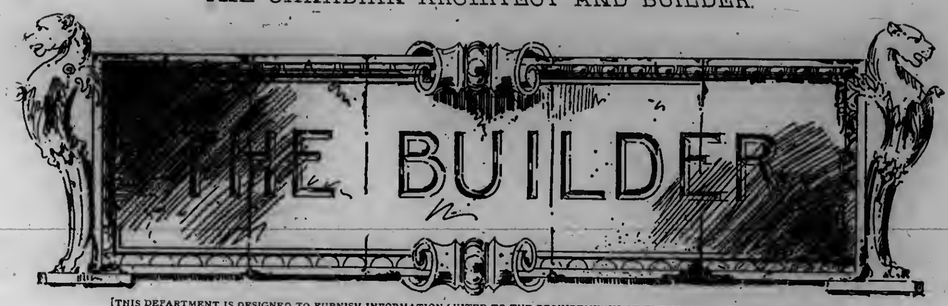
It was thereupon decided to commence a series of systematic tests of timbers, and the U.S. Government having made an appropriation, competent botanists were despatched to different localities and trees marked, full data being kept of all surrounding conditions. It was at first supposed that the method of testing small sticks, say 1" square and 12" inches long, was not a safe one, and machinery for testing large timbers was secured, but experiments proved that the testing of small pieces produced practically the same results. It was also thought that the manner of drying, whether naturally or artificially, affected the strength, but it was found that this made no difference, and that the extracting of the turpentine from yellow pine did not affect its strength.

The importance of observing the growth rings on the cross section of the logs was referred to, conclusions being drawn from the amount of spring and summer growth, which could easily be detected by the sappy nature of the former and the density of the latter; finally, reading from the latest reports, the speaker showed how accurately calculations can be made with the information now in hand, pointing out that the formulæ for compression strains could be used with slight variations for the calculation of all others. He had made tests at the School, after calculating the strength of the stick, which proved how close calculation can be made, with sufficient data, to the actual strength.

After some discussion by the members, a vote of thanks was extended to Mr. Duff.

Mr. C. H. C. Wright, of the School, followed Mr. Duff and more briefly touched on the testing of stone, brick and cement, stating that the tests of brick piers, already made by the School, had been of great use in establishing standards of this material. He spoke of further tests now in progress, of which reports would be forthcoming later. He expressed the thanks of the staff of the School to the Ontario Association of Architects, who had taken the steps which he hoped would bring about the thorough official testing of Canadian building materials, so that standards might be established which would benefit all classes of the community.

An adjournment was made at 10.15 p.m., after one of the most successful meetings of the year.



[THIS DEPARTMENT IS DESIGNED TO FURNISH INFORMATION SUITED TO THE REQUIREMENTS OF THE BUILDING TRADES. READERS ARE INVITED TO ASSIST IN MAKING IT AS HELPFUL AS POSSIBLE BY CONTRIBUTING OF THEIR EXPERIENCE, AND BY ASKING FOR PARTICULAR INFORMATION WHICH THEY MAY AT ANY TIME REQUIRE.]

"In the old Tuscan town stands Giotto's Tower,
The lily of Florence blossoming in stone,—
A vision, a delight, and a desire.
The builder's perfect and centennial flower,
That in the night of ages bloomed alone,
But wanting still the glory of the spire."

—Longfellow.

BUILDERS' EXCHANGE, WHY?

By Fred. T. Hodgson.

Why? Because it offers to builders and contractors so many advantages and opportunities, that must be apparent to everyone who has given the subject any thought, that it seems odd that every town of any importance has not got one within its corporate limits.

"What are their advantages?" it may be asked. Well, I will endeavor to point out a few, though I confess myself unable to present anything like a fair showing of the advantages and benefits that must assuredly result from a gathering of men engaged in one pursuit, and when an exchange of ideas and views on matters and things pertaining to that pursuit takes place.

Men making up the members of a builders' exchange must necessarily be men engaged in the construction, erection and decoration of buildings; bricklayers, carpenters, masons, plasterers, etc., and these again are in daily contact with other trades and occupations connected with building. The carpenter, for instance, branches off his trade and sublets portions of it to framers, roofers, stair-builders, factory men, painters, glaziers and others.

The bricklayer and mason may, and does often sublet portions of his work, such as excavating, cut stone work, brickwork, tiling, and often the plastering. Often, also, the mason supplies and places iron or steel girders, beams or bressumers, which brings him in touch with another class of tradesmen, thus extending the ramifications of the building trades. Then comes the plumber, who contracts for the water plant and sometimes for gas or electric light installation, for heating, bath service, and other lesser matters. The painter, who may be a sub-contractor, besides the ordinary work belonging to his calling, may also be decorator, paperer, and finisher, while the plasterer may engage master-stucco workers to his aid, all of whom may be employers of labor and directors of work, and are therefore, in my opinion, eligible for membership in a builders' exchange.

The men at the heads of the trades I have named are to some extent dependent on one another. Contractors on any one building must, in the nature of things, meet each other often in order to give and to receive directions regarding the work in hand. The bricklayer will have his walls ready for the joists on a certain day, and the carpenter must be made known of that fact, and the bricklayer must have assurance that the joists will be laid in place on that day. The carpenter arranges accordingly, and the ironmonger is informed, and his columns, stirrups and other work is made ready for that day; and everything is arranged to go ahead in harmony and without costly interruptions.

Now how can these men be brought together, and their views and directions exchanged, by any better method than by aid of an Exchange? Here, during the noon hour of every working day, builders and those engaged in building transactions will make it a point to congregate, or, maybe, meetings may be the consequence of prior arrangements. At any rate, should one member fail to see another at any given time, he simply pens a brief request for an appointment, naming the hour, and leaves it with the secretary or janitor, or drops it in a letter box provided for the purpose. Previous to accepting, or even figuring on a contract, it is important that the main contractor should meet and confer with all his sub-contractors, in order that he may have his final estimate and tender on the figures obtained, and to insure a fair standard of accuracy, an Exchange should be well supplied with catalogues and price lists of every article entering into the construction of a building, and these catalogues and price lists should be so classified and listed, that a member of any particular trade may be able to place his hand on the particular object he wants without delay. Further, if there is any doubt as to the reading of the plans, or a thorough understanding of the specifications, the contractor and sub-contractors may put their heads together and untangle the difficulty, and thereby make time and prevent trouble in the future.

Besides the saving of time, there is much that is educational in the congregating of members for the purpose of discussing building matters. It is impossible for a body of intelligent men to mingle with others equally intelligent, day after day, without profiting and forming acquaintances that may be lasting and valuable. Exchange of thought, of opinions on new machines, new methods and processes for labor saving, and discussions on economical management, the value of new materials and appliances, are matters that may fairly be considered within the province of a Builders' Exchange, and which must result in benefit to its members. The social feature, too, is an advantage not to be despised, for it enables the members to meet each other on the same plane without that reserve that must obtain when rival contractors never have an opportunity of becoming personally acquainted with each other. It is human nature to imagine a business rival as a sort of a "terrible fellow," and one that will take all sorts of mean advantages to obtain a contract that we have an idea justly belongs to us. To meet him in a social way and under the auspices of an association where our interests are mutual, we find that after all he is not so bad a fellow as we thought him. By rubbing against each other in the Exchange, many of the sharp edges of business rivalry get worn off, and many misunderstandings and misapprehensions are explained and rectified and jealousies allayed, and the dignity of the trades upheld. Another valuable feature is the additional character and weight an association of this kind would give to the building trades in general, and its influence on the actions of political and municipal bodies, when matters relating to buildings were involved would be immense, and in the interest of the public at large. No public body would dare to ignore an earnest request or petition emanating from a well organized and well equipped Builders' Association, that had for its object the betterment of the public service in the erection and maintenance of public buildings, sewering, paving of streets, laying out and grading of parks and public walks, building of docks, assessments, and a host of other matters, where the forcibly expressed wishes of a united body of builders would prove timely and effective. In the prevention of frauds and rascality in the awarding of public contracts, a Builders' Exchange would become a potent factor, and thus prove of much service in perpetuating good municipal government, and at the same time giving to the public full value for its expenditures. A petition or a protest, emanating from an organization, such as indicated, for or against any project, carries with it the united expression of an intelligent body, and not the opinion of a single member, and must, therefore, demand an attention that could be denied the individual. If, after proper discussion, any law is found burdensome or unjust to the building interests and the public, or perhaps too lax in its application, or not sufficiently restrictive to compel a reasonable degree of safety in such work as the members are doing, how much more effective would be a protest or a petition from a substantial organization than one from a single person? There are many other matters in which a Builders' Exchange may be made a potent factor for public good.

An Exchange may also be made use of as an educational and entertaining centre for its members and others. There might be weekly or fortnightly lectures during the winter season, at which building and architectural matters might be discussed, and at which there might be a general exchange of opinions concerning the matter of the lecture at its close. In Toronto, Montreal, Hamilton, London, and many of our towns and cities may be found men fully qualified to lecture on architecture, on construction of buildings, on sanitary science, ventilation and other matters in connection with buildings, on laws regulating the construction of buildings, on the methods and systems of building in foreign countries, and many kindred subjects. Such lectures would be instructive and edifying to all persons engaged in the building trades, and might be so arranged, by charging a small fee for admission, as to add a little money to the treasury.

In connection with the Exchange, there should be a collection of books, not necessarily a library, but a a collection of good "up-to-date" works which show and explain the most modern and approved methods of construction, and which offer to the reader all the recent devices in time and labor saving apparatus. It would be easy to name a number of these, but perhaps not wise to do so at this time. In addition to these books, there should be on the table of the Exchange copies of all the current architectural and building publications of this country, the United States and Great Britain, in connection with all government reports that have any bearing on the building trades. Directories of manufacturers of all things required in buildings should be in evidence and easy of access. Models of difficult work, samples of bricks, stone, slates, glass, hardware and the thousand and one things required by builders, should be present, with prices attached, so that any member may find out with the least effort all he requires to know about the material in point.

In the foregoing, I have endeavored to point out a a few—only a few—of the advantages that flow from a Builders' Exchange, but I am free to confess that those unmentioned are much greater than those I have presented, the truth of which, I think, any one will grasp, if he but think for a moment.

The question of inaugurating and maintaining an Exchange has not been touched, for obvious reasons; neither have any rules for its guidance been offered, as any suggestions for this purpose would not be in keeping with the tenor of this paper, but it is possible they may be subjects for future discussion.

ARCHITECTURAL TERMS.

Sometime ago the Brickbuilder, contained the following explanation of the various phrases used by architects and not generally used by mechanics, which may prove beneficial to many. The front, or facade, made after the ancient models, or any portion of it may represent three parts occupying different heights; the pedestal is the lower part, usually supporting a column, and its place supplied by a stylobate is either a platform, with steps, or a continuous pedestal supporting a row of columns. The lower part of a finish pedestal is called a plinth, the middle part of the die, the upper part of the cornice of the pedestal or surbace. The column is the middle part, situated upon the pedestal or stylobate. It is generally detached from the wall, but is sometimes buried in it for half its diameter, and is then said to be engaged. Pilasters are square or flat columns attached to walls; the lower part of the column, when detached is called the base; the middle or longest part is the shaft, and the upper or ornamental part is the capital; the swell of the column is called the entasis. The height of the columns is measured in diameters of the column itself, taken always at the base. The entablature is the horizontal continuous portion which rests upon the top of a row of columns; the lower part of the entablature is called the architrave, the middle is the freize, while the upper or projecting part is the cornice. The pediment is the triangular face produced by the extremity of the roof; the middle or flat portion enclosed by the cornice of the pediment is called the tympanum. Pedestal statues erected on the summit and extremities of the pediments are called acrosteria. An attic is an upper part of a building terminated at the top by a horizontal line, instead of a pediment.

The different moldings in architecture are described from their sections or from the profile which they represent when cut across. Of these the torus is convex, but its outline is only a quarter of a circle; the scotia is a deep concave moulding the cavetto is also a concave and occupying but a quarter of a circle; the cymatium is an undulating moulding, of which the upper part is concave and the lower convex; the ogee or talon is an inverted cymatium; the fillet is a small square or flat moulding. In architectural measure, a diameter means the width of a column at its base; a module is half a diameter, and a minute is a sixtieth part of a diameter.

Interior Finish.

It is not necessary to go out of Canada to procure handsome woods for interior finishings. For dark woods we have walnut, cherry and black birch, and for medium woods we have several of the oaks—white, red and black—which, when quarter sawn, equal, when properly finished, any oaks in the world for fineness and variety of grain and color. Then we have the despised butternut, the three or four kinds of ash, the elms, whitewood, basswood and white pine. Cherry, grown on low loamy land, is the peer of mahogany and is passed off for that wood as often as it passes for cherry. It has a fine silky grain and, if properly sawn, is veined as richly as mahogany, and will take a finish equally as well. Unlike mahogany, however, it is apt to warp and twist out of shape if not held in position. It is an excellent wood as a veneer on good pine cores. It may be easily darkened by staining the filler with some spirit stain before applying. Black birch is almost as fine a wood as cherry, and takes a finish nearly as well. As a rule it is easier worked than cherry, does not cost as much, will last as long, and makes a very handsome finish. Birch may be stained almost as dark as rosewood by using a spirit stain before filling and then staining the filling. It can be polished until it is as glossy as a polished mirror. White oak, quarter-sawn and well-seasoned, makes on the whole the most durable, and the most effective finish for rooms that are often used, or for halls or public rooms; and it has the quality of improving with age, something that cannot truthfully be said of many other woods. It is always better left in its natural color, which at first may be a little harsh, but it soon tones down to a soft, pleasing tone that is soothing to the artistic eye. Any of our oaks may be employed for trimmings, panel work, stairs, turned work, veneers, floorings or fitments of any kind. They are strong, durable and safe and not very difficult to work. Ash makes excellent chamber finish; it is bright, cheery, fantastic in grain, strong, and is not apt to get distorted or out of shape. It also makes excellent fittings for kitchens, pantries and similar work. Black ash has a grain similar to chestnut and takes stain readily. Furniture made of this wood and stained to imitate antique oak is often passed off as the latter to unsuspecting purchasers. It is a good wood to stand wear, and is especially suited to farm dwellings. Another Canadian wood that is seldom used in interior finishing is our beech. This wood, when properly filled and polished, has a very pleasing appearance, as it possesses a satiny glow and warmth that is quite charming. As a material for floors, beech ranks in the same class as maple. It is nearly as hard, is some darker and wears just as well. In the lighter woods nothing excels our white maple. This equals the much-extolled satin-wood, both as regards the fine grain and susceptibility of finish; and our birds-eye or mottled maple equals any light wood in the world in beauty, and it can be polished as smoothly as ebony. Butternut, basswood, elm and white cedar make good material for ordinary work. Butternut, when properly fitted and finished, makes a good showing and serves well in library or parlor, though not as well suited for such work as oak. White pine is the king of soft woods; it is at home anywhere, and, if finished in its natural state, shellacked or varnished properly, shows up a soft golden glow that is unsurpassed by any other wood. Some of the woods of British Columbia are well-adapted for interior finishings, while the coarser kinds make excellent framing timber, scantlings, joists, rafters, etc., etc. There is plenty of timber to satisfy all Canadian requirements, within our own boundaries, and it is foolish and wasteful to import foreign woods for interior finishings.

Good Mortar.

The late Col. Waring made a number of experiments and tests in making and using mortars for brickwork and for plastering, and the result of his experiments was that he found that ordinary coal ashes—sifted of course—when mixed with lime made a mortar superior in point of lightness and strength to mortar composed of lime and sand. In cities, where ashes are plentiful and sand scarce, the substitution of the former for the latter would reduce the cost by about one-third, and a superior article would result. Mortar composed of ashes and lime is especially adapted for the brickwork in bakers' ovens and for setting boilers, and for the brickwork in factory chimneys or any place where intense heat is likely to attack the work. Mortar composed of nine parts of fine anthracite ash intimately mixed with one part of fresh lime and properly moistened with water will, when one month old, give an average strength of 65 pounds to the square inch, as compared with 15 pounds per square inch in the case of mortar composed of lime and sand. The crushing strength is seven times greater than ordinary mortar, being in some cases as high as 1,000 pounds when extra care was taken in preparing the mass. It offers a much greater resistance to fire, and does not break and crumble away when suddenly cooled by water, as does mortar made in the old way. The best results are obtained when the ashes are finely sifted and the lime and ashes are well mixed and worked together.

Floor Deafening.

To effectively deafen a floor is rather a difficult undertaking, for in a long experience not a single method among dozens has proved as satisfactory as desired, and the most expensive methods have generally been the least effective. At Fig. 1 a very expensive method is shown;

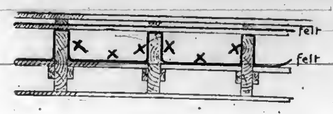


Fig. 1.

there is a matched floor between the joists, over which a coat of mortar about an inch thick is spread and continued up the sides of the joists for a couple of inches or so. On this is laid coal ashes to a depth of three or four inches. A rough floor is laid on top of the joists and well nailed. Then on the top of this rough floor is laid a course of thick felt, on which the finishing floor is laid. Another method, shown at Fig. 2, is less cumbersome and more likely to be effective. This is floored between the joists the same as the former example, then a layer of felt is laid over the joists, and passing over the top and all around the joists, so that no wood from the upper floors shall touch the joists at any point. On the joists is then laid a rough floor—thicknessed, of

Fig. 2.

course—and over this is placed one thickness of flooring felt. Then, on a line with the joists, battens ⅞ of an inch thick are laid as shown, and on them the finished floor is laid. This is a very good way, but there is really no actual necessity to run the felt down the sides of the joists and along the bottom boarding, as shown at X X X. This is a waste of labor and material; a strip of felt laid over the top edge of the joist answers just as well as covering the whole surface. It may then be asked, "What's the use of the boarding between the joists?" Well, for deafening purposes, it is of no value; if for keeping out cold, then it is all right as far as it goes. A cheaper, and perhaps a more effective method than either of the two shown is to first lay a strip of soft felt on the top of each joist, then lay the first floor, cover this with felt and put down the finishing floor on this; then tack strips of soft felt on to the under edges of the joists, and lath over the strips. This cuts off all communication between the floors and the ceiling, so far as woodwork is concerned, but the nails that are used for nailing on the felt often convey the sound from the floors to the joists, and so on to the ceiling below. No effective cutting off of sound, however, can take place so long as the joists rest their ends on girts or bond timbers in the walls, for sound travels along the floor to the wall, and is then transmitted to the joists, and by them passed to the walls and then on to the other floors. Felt, lead, or other "deadening" material should be placed under the ends of all joists, and between them and the plates of all partitions, if effective deafening is required.

MANUFACTURES AND MATERIALS

GLASS AS A WALL COVERING.

In recent years glass in a variety of forms has been applied to many purposes in building, and seems destined to find employment to a still greater extent in the future. A year or so ago it was reported that in France glass bricks were being manufactured and were likely to come into use. It has been decided to build on the grounds of the Paris Exposition a glass house or luminous palace, parts of which are now being constructed. It is thus described: "The principal facade, in the form of an immense portico, its roof surmounted with spires and with a winged statue representing Light, will be supported by heavy columns. The ground floor, reached by a double flight of stairs, will be used as a great exposition room. To the right and left will be large glass

Glass Wall Covering in Bath-Room.

basins, overhung by grottoes of glass. In the interior of the hall will be five large openings, in which will be represented the five divisions of the globe."

Much attention has been bestowed on methods of utilizing glass as a covering for walls. Where success has been attained so far as the manufacture of the slabs or tiles was concerned, the cost of the production has been too great to allow of the general use of the material. Perhaps the most successful experiment in this direction was made by Mr. Butler of Gas City, Indiana, who produced a plate of glass about half an inch thick in a mould, a tongue being formed on the back of the tile which could be inserted in the joints of ordinary brick work while building. In practice it was found that the excessive weight of the wall caused the tiles to break, and frequent replacement became necessary. Mr. Butler next perfected solid glass tiles about one half inch thick, pressed in moulds containing designs which were thus reproduced on the surface of the glass. These tiles were plated on the walls when built. Some of them are still to be seen in position on the walls of the Penn

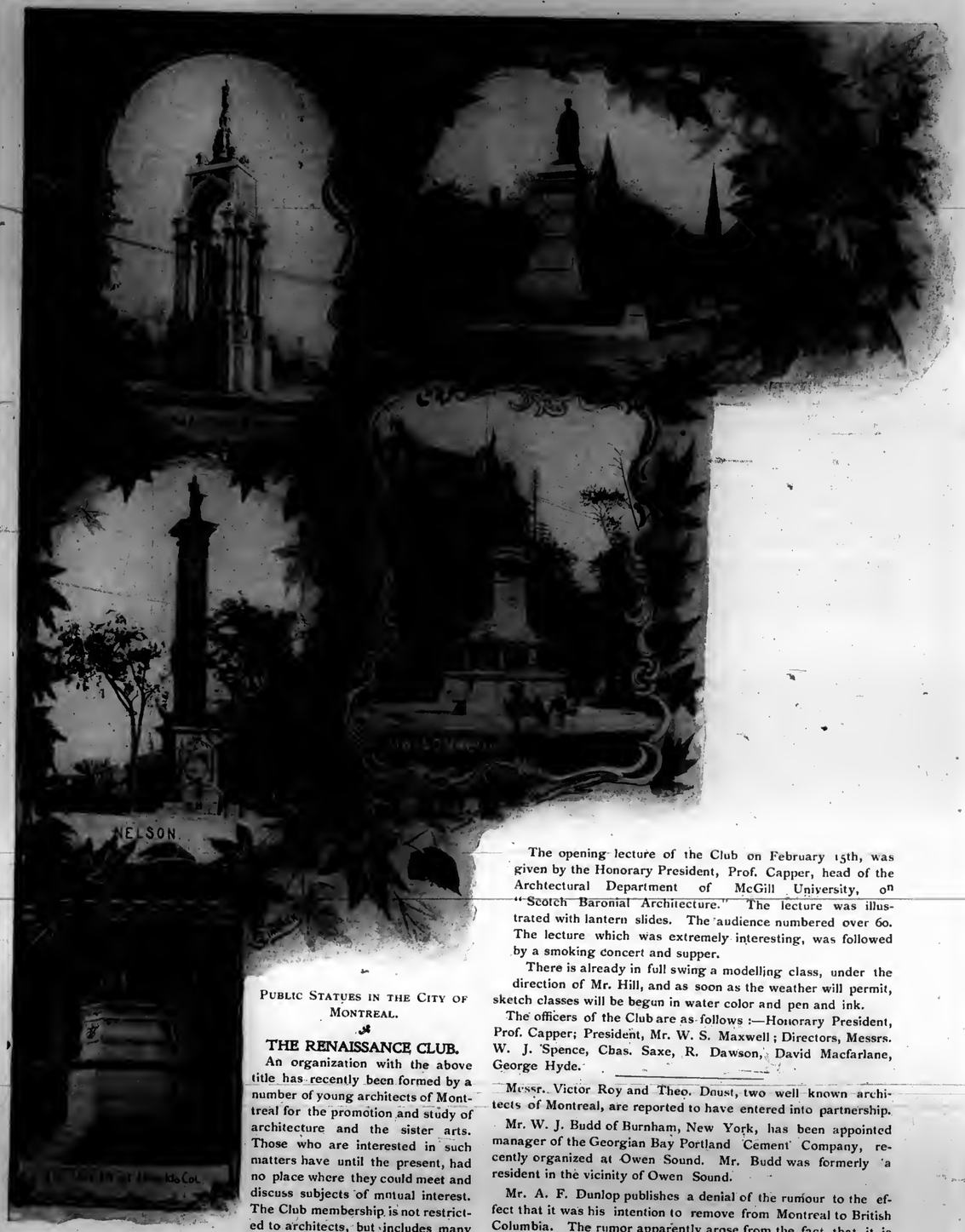
Glass Wall Covering in Deposit Vaults, Temple Building, Toronto.

Block, Penn Avenue, Pittsburgh, Pa. The material in this form likewise proved to be too expensive.

Mr. Edwin Hill of the Toronto Plate Glass Importing Co., has recently perfected a process of plating walls with glass, which seems to fulfil all requirements. The tiles which are about one-tenth of an inch in thickness, are made either in pure white, or in any tint or color desired, and of every conceivable shape or size. They are solidly backed in cement on a foundation of plaster. The cement being of a plastic nature, becomes tenacious and extremely hard, thus preventing either the tiles or plaster from becoming loose. The character of the work is such that it is unaffected either by excessive dryness or moisture. The cost of this material is said to be about one-half that of glazed tiles. Its adaptability as a sanitary wall covering for hospitals, etc., is at once apparent. The accompanying illustrations show the material in situ as a dado in a bathroom, and on the walls of the safety deposit vaults in the Temple Building, Toronto.

The Canadian Granite Company of Ottawa have commenced the manufacture of silica sand from sandstone deposits belonging to the company in March township. The material is ground to the fineness of salt, and is used in the fluxing of iron.

A syndicate of English and American capitalists have purchased from the Messrs. White, of Windsor, Ont., the stone quarry at Amherstburg, Ont. It is the intention of the new owners to operate the quarry at its full capacity. Stone from this quarry was used for the canal locks of the Sault Ste. Marie Canals, and for the United States Fort at Detroit, as well as in the construction of a number of public buildings.



PUBLIC STATUES IN THE CITY OF MONTREAL.

THE RENAISSANCE CLUB.

An organization with the above title has recently been formed by a number of young architects of Montreal for the promotion and study of architecture and the sister arts. Those who are interested in such matters have until the present, had no place where they could meet and discuss subjects of mutual interest. The Club membership is not restricted to architects, but includes many of the leading artists, and a number of art students and persons interested in art and literary work. The membership is however limited to sixty-five, and is already upwards of fifty. The headquarters of the Club is at No. 4 Phillip's Square where rooms have been furnished and decorated, and are open to members at all hours.

The opening lecture of the Club on February 15th, was given by the Honorary President, Prof. Capper, head of the Architectural Department of McGill University, on "Scotch Baronial Architecture." The lecture was illustrated with lantern slides. The audience numbered over 60. The lecture which was extremely interesting, was followed by a smoking concert and supper.

There is already in full swing a modelling class, under the direction of Mr. Hill, and as soon as the weather will permit, sketch classes will be begun in water color and pen and ink.

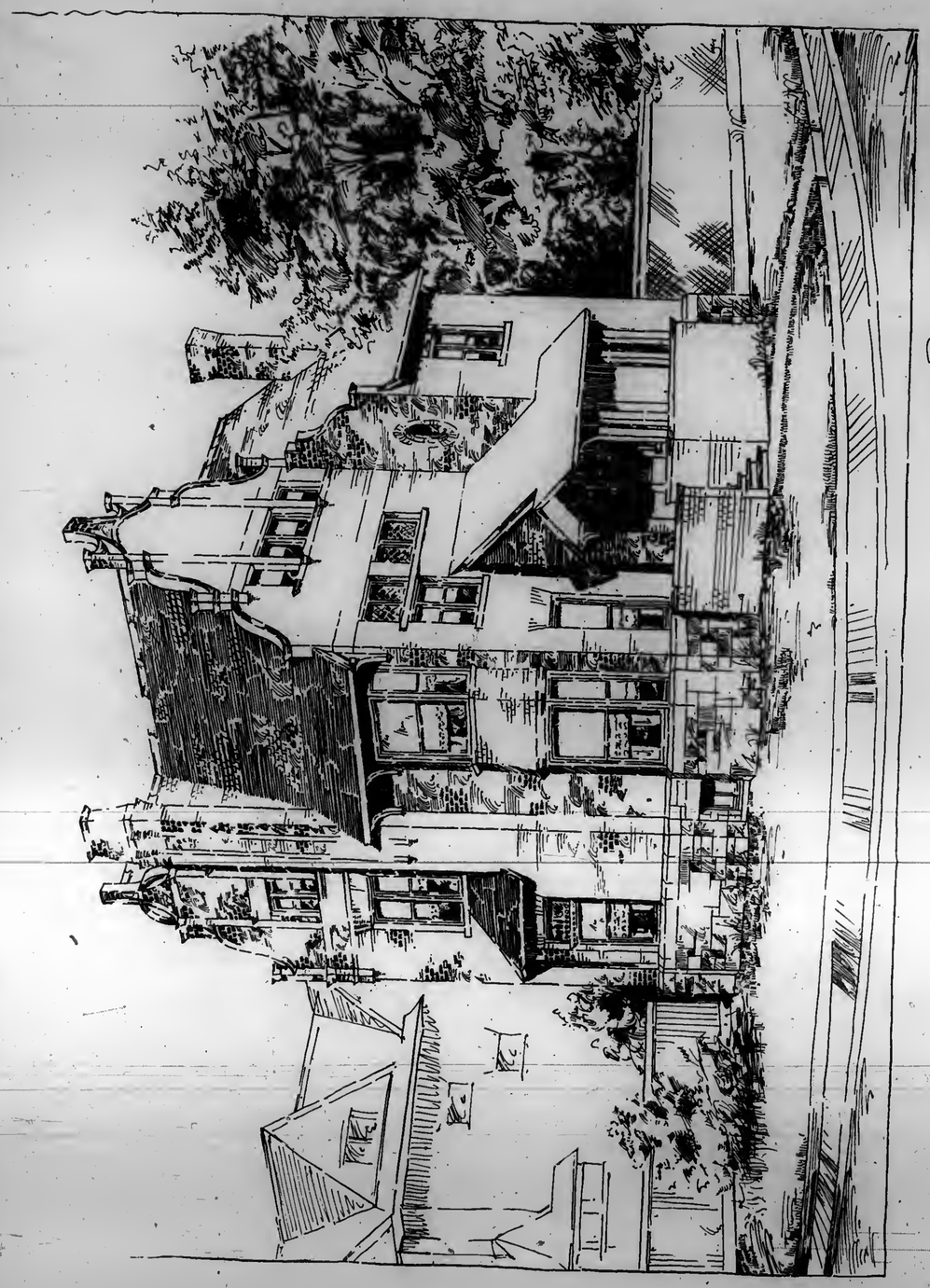
The officers of the Club are as follows :—Honorary President, Prof. Capper; President, Mr. W. S. Maxwell; Directors, Messrs. W. J. Spence, Chas. Saxe, R. Dawson, David Macfarlane, George Hyde.

Messr. Victor Roy and Theo. Doust, two well known architects of Montreal, are reported to have entered into partnership.

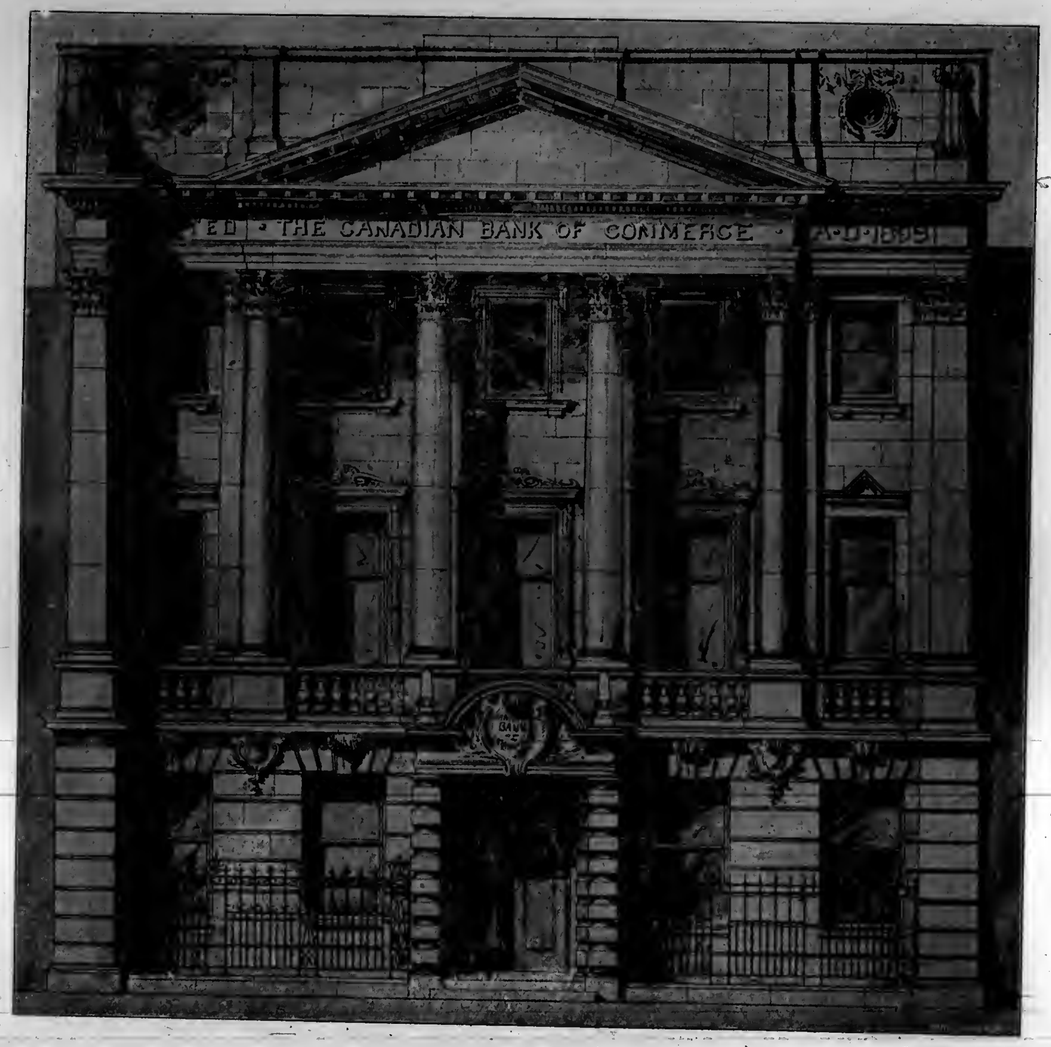
Mr. W. J. Budd of Burnham, New York, has been appointed manager of the Georgian Bay Portland Cement Company, recently organized at Owen Sound. Mr. Budd was formerly a resident in the vicinity of Owen Sound.

Mr. A. F. Dunlop publishes a denial of the rumour to the effect that it was his intention to remove from Montreal to British Columbia. The rumor apparently arose from the fact that it is Mr. Dunlop's intention at an early date to visit Vancouver.

Richard J. Hovenden, who was for many years a well known painter and dealer in painters' and artists' supplies in Toronto, is reported to have become heir to a large estate in Queen's County, Ireland. Mr. Hovenden, who now lives in Windsor, Ont., will shortly visit Ireland with reference to this matter.



RESIDENCE FOR MR. JAMES GERMYN, ROSEDALE, TORONTO.
A. F. WICKSON, ARCHITECT.



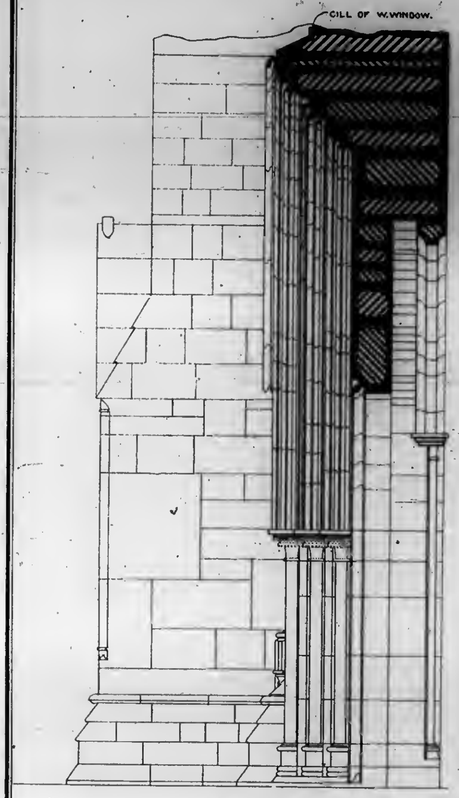
BANK OF COMMERCE, WINNIPEG, MAN.

DARLING & PEARSON, ARCHITECTS.

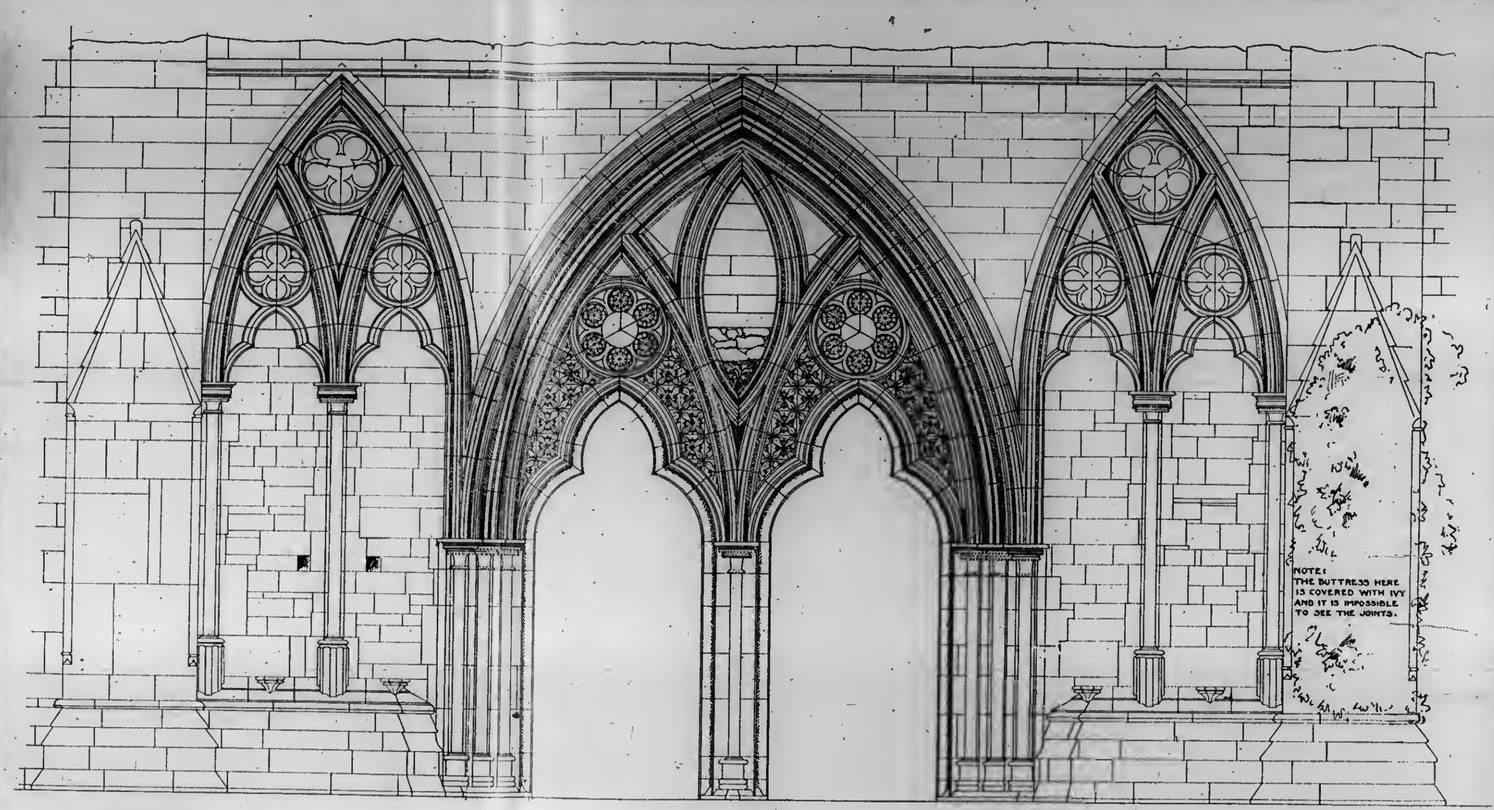
RESIDENCE OF LORD MOUNTSTEPHEN, SHERBROOKE STREET, MONTREAL.
W. T. THOMAS, ARCHITECT.

PARLIAMENT

MESSRS. FULLER & JONES, STE



SECTION



ELEVATION

TINTERN ABBEY
WEST DOOR

SCALE OF FEET 0 1 2 3 4 5 6 7 8

PLAN

NOTES: THE DIAPER WORK IS ONLY HALF FINISHED AND BEARS TRACES OF COLOUR - (RED).
THERE ARE TRACES OF PLASTER AND FRESCO WORK IN THE NICHES AT SIDES, WHICH ACCOUNTS FOR THE ROUGHNESS AND UNEVEN JOINTING OF THE STONEWORK THERE
THE SHAFTS IN ALL CASES HAVE DISAPPEARED AND BASES ARE MUCH DAMAGED, ALSO PEDESTALS IN NICHES AT SIDES.
AMONG THE RUINS OF THE ABBEY ARE THE REMAINS OF A STATUE WHICH APPEARS TO HAVE BEEN THAT OF A MADONNA AND CHILD - IT IS ABOUT THE SIZE OF THE CENTRE NICHE AND MAY AT ONE TIME HAVE BEEN THERE.
THE NICHE IS HALF FILLED UP WITH LOOSE STONES AND ONLY HALF OF THE CARVED PEDESTAL EXISTS.

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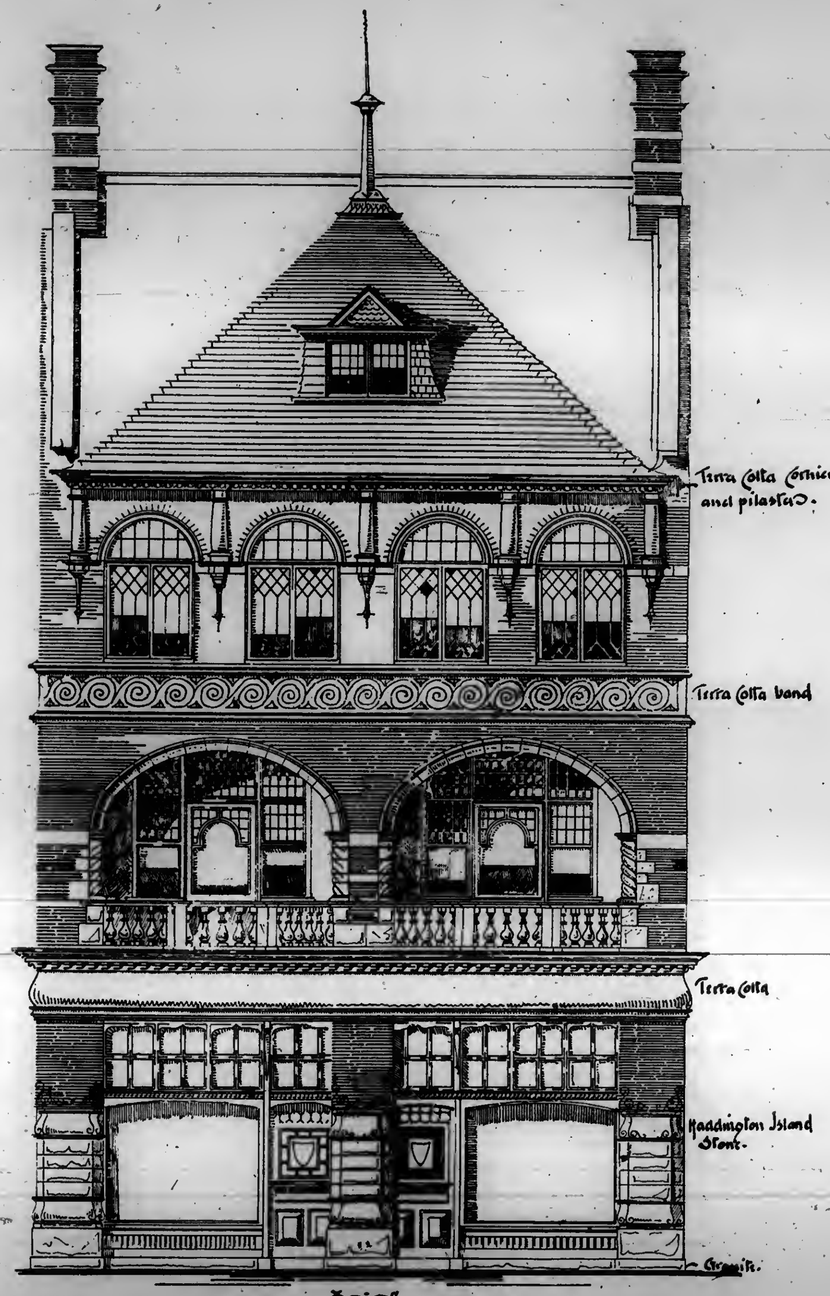

Study for Business premises with dwelling above

Scale of feet. 1/4" of one Inch to one foot.

Robt. M. Fripp. A.R.I.B.A. Archt.

Victoria. B.C. 1892.

CANADIAN ARCHITECT AND BUILDER.

VOL. XII.—No. 4. APRIL, 1899 { PRICE 20 CENTS. $2.00 PER YEAR.

—THE—

CANADIAN ARCHITECT AND BUILDER,

A Monthly Journal of Modern Constructive Methods.

(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD).

PUBLISHED ON THE THIRD WEDNESDAY IN EACH MONTH IN THE INTEREST OF

ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

The C. H. MORTIMER PUBLISHING CO. of Toronto, Limited, Publishers,

Confederation Life Building, - TORONTO, CANADA.

Telephone 2362.

Branch Office: NEW YORK LIFE INSURANCE BUILDING, MONTREAL.

Bell Telephone 2299.

SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to foreign subscribers is $2.50. Subscriptions are payable in advance. The Journal will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrears of subscription paid.

ADVERTISEMENTS.

Prices for advertisements sent promptly on application. Orders for advertisements should reach the office of publication not later than the 12th, and changes of advertisements not later than the 5th day of the month.

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Contributions of value to the persons in whose interest this journal is published are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

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St. Lawrence Market Competition.

ONLY five sets of plans were submitted in the competition for designs for the remodelling of St. Lawrence market, Toronto. Good reason must exist for the lack of interest taken in this competition, the subject being well calculated to attract the attention of the best minds in the profession. The failure of the competition as regards the number of competitors can doubtless be attributed to the inadequate character of the rewards. Architects should not be expected to give services worth $4,000 for the chance of winning a prize of two or three hundred dollars. The opinion generally prevailed that the work could not be carried out within the limit of cost imposed, namely, $150,000. It will be remembered that Mr. Sheard, who was appointed by the Council to report on the cost of the work, estimated the price at upwards of $300,000. The result of the competition will probably not be known for two or three weeks. The examination of the plans will occupy considerable time, as full working drawings, embodying all details of construction, were required.

Signed Buildings.

AN enterprising Toronto paper, in the daily search for news, has discovered that the words "E. J. Lennox, Architect, 1889," have been carved in stone beneath the cornice around the four sides of the new municipal buildings. The announcement of this fact is headed, "Lennox's Gigantic Gall!" and we are told that "the well-taxed citizens of Toronto ought to present Architect Lennox with the new civic building and be done with it." The citizens, sensible people that they are, have declined to follow the newspaper's example by going into hysterics about so unimportant a matter. It is pertinent to inquire what crime has been committed. It is a recognized custom in Belgium for architects to affix their names to their buildings, and the practice has many advocates among the profession

and the public in Great Britain and other countries, as being one calculated to induce architects to put forth their best efforts, besides assisting to preserve a record of important buildings. In the present case it is said that the letters were cut by the stone carver while the architect was absent from the city. The letters are about seven inches deep and are spaced fifteen feet apart. Being 72 feet above the ground and imbedded in the ornamental carving, they are by no means conspicuous—indeed, only the closest scrutiny would discover them. As a public advertisement for the architect they would be pronounced a complete failure. This object could have been better served by an inscription placed so as to meet the eye of visitors to the building. Even had the architect gone so far as to have his portrait cut in stone on the buildings, he would have been able to point to local precedents for his action. A prominent feature of the carving of the main facade of the Ontario Legislative Buildings, at Toronto, is a group of life size figures of the architect, Mr. Waite, the late Minister of Public Works, Mr. Fraser, and several of the other cabinet ministers, while on the whole building there are said to have been carved the portraits of a score of prominent politicians. On the Toronto Custom House are also to be seen carved busts of the men who designed and built the structure.

The Ontario Association of Architects.

We direct the attention of architects to a circular, reprinted in another column, issued by the Registrar to the members of the Ontario Association of Architects, asking for an expression of opinion with regard to the advisability of entering upon certain specified undertakings in pursuance of suggestions and recommendations made at the recent annual convention. It is gratifying to observe that an effort is to be made to increase the usefulness of the Association, and we trust that in this effort the management will have the cordial co-operation and support of the entire membership. With the improved conditions now prevailing, the present is an opportune time for placing the Association on a more successful footing. The proposal to offer encouragement to students is one of vital importance, and we trust that ways and means may be devised of carrying it into execution. It is absolutely essential to the success of the Association that it should have the sympathy and support of the oncoming generation of architects. There are other matters not mentioned in the circular which should engage the attention of the Association. From the report of Mr. Totten, representative of the United States Government at the International Congress at Brussels, it appears that in Germany, Austria, Italy, Great Britain and France, it is the practice of the government to invite architects in private practice to submit designs in competition for important public buildings. This practice was also adopted by the Government of the United States some two or three years ago, and everywhere that it obtains, it appears to give satisfactory results. The International Congress of Architects above referred to, after carefully considering this subject, put on record the following opinion: "It is desirable that the construction of public buildings should be confined to private architects, chosen by public or private competition or otherwise, and that the architects superintend the erection of the works, but under the direction of the government." Why should not the government of Canada step into line with the governments of other countries in this regard? Would it not be advisable for the Architectural Associations of Ontario and Quebec to memoralize the government at its present session to throw open to competition important public buildings, thereby giving encouragement to the architects of the Dominion, and securing greater variety and excellence in the designing of our public buildings?

Workmen's Compensation Acts.

An act to amend the law with respect to Compensation of Workmen passed the Ontario Legislature at the recent session. It is the evident intention of the government to deal with the subject in a more comprehensive manner next year, as they have commissioned Prof. Mavor, of Toronto University, to study and report upon the operation of the British Act. Judging by the comments of our British exchanges, the operation of the law in Great Britain is anything but satisfactory. Regarding it The Builder has this to say: "The misfortune of the numerous decisions on the Workmen's Compensation Act is that they do not settle any principle. There arises in these cases the question whether certain facts bring the matter within the Statute. No sooner is one case decided than another, different in its circumstances, turns up, each decision tending to show how unfair is the working of the Act. Last Saturday the question which came before the Court of Appeal was whether painting a house was "repairing" it within the meaning of the Statute, and whether the rung of a ladder was a "scaffold." The Court of Appeal reversed the decision of the County Court Judge, and held that the case did not fall within the Act. We confess that we cannot see why painting is not repairing. Woodwork requires paint for its preservation; a roof requires slates put in. Yet, apparently, if a workman loses his life while painting a building he is not within the act; yet if he were putting a few slates on a roof, he would be entitled to compensation. Again, a carpenter who fastened a bit of wood to a window would be entitled to damages if injured—he was repairing the building. But if he painted it afterwards he would be excluded if injured at that particular time. The truth is, as we have over and over again pointed out, that the Act is most absurdly limited. There is no principle in it; there is an arbitrary limitation introduced simply and solely because the persons excluded had not sufficient electoral powers to make it worth while for the government to include them within the provisions of the Statute." The Builders' Reporter says that if the Act is to remain in force, a special dictionary of the English language will have to be prepared for the use of litigants, as the Court of Appeal has decided that a mortar mill is a factory within the meaning of the Act. In another case the question arose whether a wharf was a factory. These instances will suffice to show the loose construction of the Act, and the difficulties and hardships to which it must give rise. It is to be hoped, therefore, that Professor Mavor will be careful to learn the weak points of the measure, and thus be able to advise the Ontario legislators what to avoid. Laws of this character fall heavily upon workmen advanced in years. The entire responsibility for accidents is thrown upon the employer, who in turn seeks to protect himself as far as possible by engaging only young men who, because of greater activity, are considered to be less liable to injury.

SAFETY FROM FIRE IN HOTELS.

The burning of the Windsor Hotel at New York has made conspicuous to everybody who reads the newspapers that it is of the first importance that a hotel should be fireproof. But this is no new idea to the public who use hotels; nor was it a surprise to Greater New Yorkers who have avoided the Windsor, when they wanted to put up for the night in town, that at last it has been the scene of a catastrophe. It was known to be a fire-trap and lost custom on that account. It is not merely to satisfy the building department that a hotel must be fireproof. Its custom depends upon its being so. The main difficulty is however not in making the building fireproof but in making it fireproof without detracting from that appearance of luxury which is considered necessary in the finish and appointments of a first-class hotel. If it were only a question of dealing with men, a thirteenth century fireproof severity with nineteenth century arm chairs might perhaps become the style of finish most popular for hotels: satisfying the mind by being evidently fireproof and the eye by a spacious, architectonic dignity. But women are not so one-sided. The same woman who lies awake at night in a hotel for fear of being burnt in her bed, would be anything but pleased with an incombustible interior finish. There must be, rightly or wrongly, in a hotel such elegance and luxuriousness of finish and furnishing that, even if the building is fireproof and will not burn down, we fill it with combustible material enough to cause death to its inmates from panic or suffocation or even from the spread of the flames. The Home Life Building is an example of the way in which fire can find food in a fireproof office building. One would expect a hotel to furnish more food of this kind rather than less; at any rate its carpets, curtains and upholstery will be the source of an easily produced and pungent smoke, which is in itself a danger. How much smoke will produce suffocation or how little smoke a panic we cannot tell. But it is necessary to make provision to prevent either danger. In other words no matter how thoroughly fireproof the structure of the hotel may be, the system of fire exits must be as complete as if the building itself were combustible. It would be safe to say that, tried by a genuine standard, any one of the usual precautions is ridiculous. The rope which is to be found beside the window in every bedroom of a New York hotel suggests nothing but the fulfilment of the letter of some by-law. The only persons who could possibly use such a means of exit from an upper window are the young men who are usually to be found in the cheaper rooms which look into interior courts—the last place one would like to lower one's self into in case of fire. The skeleton iron fire escapes on the outside would, above a certain height, be bad enough for most men, in the hurry and whirl of a fire, and impossible for women. But more than this they would not be easily found. There is in New York, tacked upon the inside of the door in every room, a small plan of the building with stairs and fire escapes colored red, which presumably satisfies a by-law, but in case of need would mock an architect. Nor are the notices "to the fire escape" at the turning of a passage, certain to be of use in the midst of hurry and fear and smoke, unless the way they indicate is so obvious that it is apparent without their aid. The first essential in providing for safety from fire in a hotel is a simple plan and obvious exits. Indeed it is not too much to say that the backbone of a hotel plan must be, as it is in a theatre, the exits. They must be so plain that no one can miss them, and there must be exits at each floor. The stairs cannot be taken account of at all in providing for descent in case of fire. Here then is the problem—exits on every floor and the old gymnastic fire escape ruled out.

There must be a fire exit at the end of every passage and at each end if the passage is a through passage. This for two reasons. In the first place one must presuppose ignorance on the part of the guests about anything more of the plan of the hotel than where the stair or elevator lies in relation to their rooms, and, both stair and elevator being out of the question, as being the channels for smoke, it is necessary to make sure that if they flee in any direction from the smoke they will ultimately come to a fire exit. In the second place, as staircases and elevator shafts are likely to be near the centre of the building, the ends of passages are more likely to be especially free from smoke, than especially sought by it. The end of every passage should open upon a balcony large enough to safely accommodate a number of people at once. Over the door to the balcony may be, framed in iron, heavy glass of the luxfer prism order, sufficient to illuminate the passages, but not likely to be soon injured by heat. All other openings should be kept as far as possible away from the balconies, so that they may come in the centre of a vertical band of blank wall as wide as possible. They will thus be as free as possible from smoke.

If then we may assume that the inmates are safely got out of doors, and are there in safety for the moment, it only remains to get them to the ground. This is comparatively easy. The balconies should communicate with a tower large enough to contain an easy and expanding staircase, with a door and landing at the level of each balcony and a door at the bottom to the street. Here is a means of descent cut off from the fire by solid walls, and with its openings for light and its door of exit looking away from the fire, with nothing to burn in its own structure and no direct communication with the source of smoke. The guests of the hotel ought, even in haste and fear, to feel a consciousness of security when they get this far, and descend without panic to the level of the sidewalk. It would be easy to contrive a pair of doors at the bottom which would be closed to entrance from the street but would fly open outwards when approached from the inside. As to the other doors at the ends of the passages, there is no occasion why they should ever be locked. They should be spring doors opening outwards in the thickness of the wall, and should have painted on them in letters that he who runs may read, "fire escape—push." With a legend like this at the end of every passage, no guest could go to and from his room without learning what to do in case of fire; and, if we are right in supposing this is to be a good plan and its use became common, every traveller would be so familiar with it that in case of fire the guests would act together with some approach to the precision of drill.

From the designer's point of view there is no doubt that the towers and balconies would form an admirable external motive. There is usually more inclination for towers on the part of designers than reasons for their introduction. Here is a reason which not only demands their introduction but indicates that they should be conspicuous, both to call the attention of present guests to their use, and to remind the public, as possible guests, that here they will be safe from fire.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.

THE ROYAL CANADIAN ACADEMY.

The official opening on April 7th of the 20th Exhibition of the Royal Canadian Academy by Lord and Lady Minto at the Art Galleries, Montreal, was a decided success.

The President, Mr. Robert Harris, in his opening address gave a sketch of the history of the institution, pointing out the struggle upwards it has had since the day of its inauguration by the Marquis of Lorne and H. R. H. Princess Louise, twenty years ago.

Lord Minto in his reply congratulated the academy on the success of the exhibition and then urged the necessity of national character in art. "Let Canadian art" he said, "be typical of Canadian scenery, Canadian life, Canadian thought and character." This idea should also be borne in mind by architects and let them make their branch of art typical of Canada and suited to its climate, with its necessities and restrictions.

In glancing over the exhibition as a whole one may say that the standard usually seen at these galleries is well kept up, though perhaps not eclipsing one or two of its predecessors. The president shows two portrait canvasses, one a group of Mrs. Porteous and her young children, the other a single portrait of the late Robert Hamilton of Quebec. Both will bear comparison with Mr. Harris' former works and seem to be very popular. Mr. Brymner only shows one canvas, which no doubt the public regret. The scene depicted is a quiet pastoral landscape with a decided tendency toward the modern French school. Mr. Homer Watson has three strong landscapes in his usual style. His "Crossing the Ford" would be improved somewhat by a different treatment of sky. Mr. Maurice Cullen shows a view on St. Catharine street, Montreal, with the tower of St. James Methodist church (of which so much has been heard of late) in the distance—the scene is by moonlight, and shows this artist at his best. The water-color room shows a very good collection of drawings of which we might mention the work of Mr. O'Brien and Mr. Manly, while from an architectural standpoint, the drawings of most interest will undoubtedly be those of Mr. Martin. One should specially note his "Roman Arches at Verona" and his view of Dieppe Cathedral.

The architectural drawings are few in number and it is a surprise to see so many firms not represented, several well known names being absent. This may be accounted for somewhat by the fact that these drawings are generally relegated to the stairway or some obscure corner, but still this can hardly account for the seeming lack of interest on the part of exhibitors.

To take the drawings in detail in the order in which they hang on the walls, we first come on ascending the staircase to two water-colour drawings by Saxe & Archibald, (a young firm of Montreal architects,) one on each side of the doorway. These drawings are strong and full of life, though there is a slight tendency to too much of what might be called the "scenic." Let the drawings be strong, but not at the expense of a quiet and dignified character. The coloring of the front of the Apartment House is too strong while the projecting columned portico does not stand out sufficiently. Next to these is a pen and ink rendering of an office building, also by one of the younger members of the profession, Mr. Gardiner. The rendering is good, while the design is of a quiet but effective character. Above it hangs a drawing by Mr. Dick, of Toronto, an exterior view of the Toronto University Gymnasium. This drawing is somewhat flat, and can hardly be called a good example of pen and ink rendering. Next come two drawings in monochrome, one the new Chemistry and Mining Building at McGill University, the other a recently constructed branch for the Molson's Bank at Vancouver. Better work than either of these drawings has been shown by their author, Mr. A. T. Taylor, of the firm of Messrs. Taylor & Gordon, and in the case of the McGill building, at any rate, hardly does justice to the structure.

Messrs. Hutchison & Wood are represented by a good water color drawing of the front of the proposed "La Presse" building at Montreal. The tone of color is very good, but no trace could be found of the draughtsman's name.

Mr. C. H. Capper, the Professor of Architecture at McGill, shows a pen and ink drawing of an extension to University Hall at Edinburgh. This drawing shows a very good example of the English school of pen and ink work. Mr. Gustav. Hahn is represented by three decorative panels, while Mr. Chaloner shows a pencil cartoon sketch of a panel for one of the Richelieu & Ontario boats, representing a tribal chief giving orders to his Indian followers.

By the above notes it will be seen that the exhibition is not strong in architectural works, and exhibitors should bear in mind that if they want the general public to take an interest in their work they must make their drawings interesting to the public. This probably can be achieved by exhibiting colored perspective sketches of exteriors and interiors of rooms, while details of decorative work are generally interesting. The general public, as a class, enjoy what they can see as a whole, and the effect the building, whether exterior or interior, would have in reality. This, as a rule, can be obtained by color easier and more effectively than by pen and ink rendering. Far be it from the writer, however, to persuade architects to drop pen and ink rendering, as this class of work is fully appreciated by the profession if not by the public, and it is also better for reproduction. The question which naturally comes up is whether an exhibitor sends his drawings for the general public or for those who really understand and can appreciate good architectural draughtsmanship and work which will not appeal to the public. It is hoped in future exhibitions that there will be a stronger and better collection of architectural work, and that we may see work of a decorative character, or what might be called the Arts and Crafts Class, shown by drawings. This class of work has been almost entirely neglected.

COLLAPSE OF THE NICOLET CATHEDRAL.

This cathedral, situated at Nicolet, Que., about fifty miles from Montreal, was just about completed and the workmen were putting on the finishing touches when one of them noticed that the columns and piers were giving way. They immediately proceeded to brace them up with chains and planks, but before their work was completed one of the piers gave way, letting down the central portion of the structure, followed later by other sections, and according to reports the dome and rear part will also have to come down as some of the columns are broken. The damage is said to amount to $40,000.

The columns are said to be constructed of concrete, with an iron core, and the piers were of brick laid in cement mortar. It has been reported that the brick piers were not large enough, and that they were put up during frosty weather, which caused the cement mortar to freeze. Lately there was a fire built to thaw out the basement and it is explained that the heat striking the piers on one side caused that side of them to settle and throw the columns out of plumb, with the result that, not being of regulation metal, they either broke or slipped off the base. But more definite information will be obtained when the experts appointed to look into the matter have made their report.

The following gentlemen have been appointed as experts and visited the place on Thursday: Messrs. S. Lesage of the firm of Perrault & Lesage, and C. Dufort of Rodden & Dufort, on behalf of the Bishop, and Mr. Jos. Haynes, C.E., on behalf of the architect, Mr. St. Jean. The contractors, Messrs. Paquet & Godbout, have refused to accept the manner of proceeding, as being irregular, and were not represented at the examination of the ruins. It is more than likely that the question will find its way to the court and there be thoroughly ventilated, which will probably be the most satisfactory conclusion to all concerned.

It is understood that the Bishop consulted Mr. S. Beaudin, Q.C., on the subject, and the learned counsel informed his Lordship that the architect and contractors were jointly and severally liable according to law and the investigation must proceed on that line.

NOTES.

The extensive manufactory of Messrs. Garth & Company, at 542 Craig street, was recently damaged by fire to the extent of about $60,000. It is understood that the loss will be almost covered by insurance.

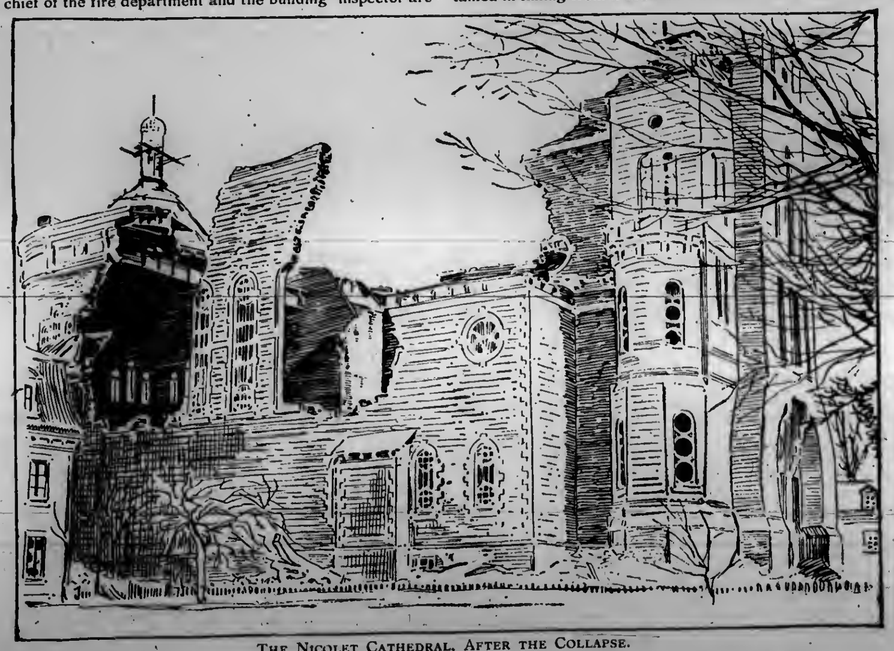
THE NICOLET CATHEDRAL, BEFORE THE COLLAPSE.

The La Prairie Pressed Brick and Terra Cotta Company of this city have decided to liquidate their business, and have appointed as liquidator Mr. T. Westbrook. The total liabilities, including liability to shareholders, is placed at $150,443.

The chief of the fire department and the building inspector are engaged in making an inspection of all public buildings, including convents, colleges, hotels, etc., to ascertain if they are provided with necessary appliances to enable the inmates to escape in case of fire.

The Merchants' Bank of Canada have invited Messrs. Hutchison, Hopkins, Maxwell and Taylor to submit competitive designs for the remodelling of their building at the corner of St. James and St. Peter street. It is the purpose to add four additional storeys to the building.

Several serious accidents have occurred in this province lately, due to the collapse of buildings. The latest of these took place in this city on the 10th inst., when a provision warehouse on Commissioner street tumbled into ruins. The collapse in this instance was due to the weight imposed by a large stock of flour and provisions on the upper floor. A workman who was in the building at the time was seriously injured.



THE NICOLET CATHEDRAL, AFTER THE COLLAPSE.

A laborer named Robillard recently brought an action against Mr. Peter C. Wand, a well known contractor, for injuries sustained in falling from a scaffold on one of the McGill University buildings while in the defendant's employ. Mr. Justice Taschereau awarded the plaintiff the amount of two and one half years' wages, less 25 per cent., this deduction being made because it was shown that the plaintiff had been imprudent, and had contributed to the accident by jumping on the scaffold from a brick wall. The accident was caused by the breaking of a board which the court decided was not strong enough for the use for

which it was put. Judgment was given for the sum of $712.50 with costs.

Referring to a recent lecture by Professor Cox, in which the importance of ventilation and the use of open grates was emphasized, a correspondent pertinently enquires if the inmates of houses in this climate would not be likely to suffer as great injury from draughts as by impure air, and calls upon the Professor to explain the system by which ventilation by grates and windows, without draughts, can be secured in winter.

Although the building season opens rather later than usual this year, prospects at present are very favorable. Nearly all of the architects' offices are full of work, and both architects and contractors are looking forward to a busy time.

The Council of Arts and Manufactures closed on the 7th inst. a very successful season's study. The classes have been well attended, over 450 pupils being entered from this city alone. A formal closing will take place next month—date not yet fixed—at which addresses by the Provincial Ministers and also by the professors will be delivered, prizes presented to the successful students, and an exhibition given of the work done during the winter evenings.

The collapse of the building at 71 Commissioners street occupied by Messrs. F. X. Benoit & Son, flour merchants, proves conclusively the necessity of a thorough inspection of all large buildings, etc., throughout the city. This building was remodelled and the interior specially constructed for its present use three years ago. The accident is stated to be due to faulty construction, the iron girders only being embedded about four inches in a brick wall. Messrs. Lacroix, building inspector, and Benoit, chief of the Fire Brigade, will commence immediately an inspection of the city structures, and hope to complete their work in about two weeks. Their report will be given in our next issue.

The civic hospital was visited on the 12th inst. by the special committee appointed by the Health Committee for that purpose, viz., Ald. Prenoveau, Ames, Turner, Gallery & Dufresne; the Medical Health Officer, Dr. Laberge, and the architects, Messrs. Perrault & Mann. The object of the visit was to ascertain the condition of the building, and after a thorough inspection had been made it was unanimously decided that the building was not in immediate danger of collapsing, and orders were given to shore up the structure where needed. The site of the new building has not yet been decided upon, but no time will be lost, as work will be commenced as soon as the frost is out of the ground.

WORDS OF APPRECIATION.

QUEBEC, March 29th, 1899.

To the Editor of the CANADIAN ARCHITECT AND BUILDER:

SIR,—While I cannot agree with you as to the present being the closing year of the nineteenth century, since one year more—the year 1900—is required to complete it; every 100 being made up, not of 99 units, but of 100 of them—I am free to say that your last issue is a splendid one in every respect, and replete with the best of literature on many most pertinent subjects.

I would more especially refer to Gambier-Bousfield's paper under the heading (at page 58) "Students' Department." This paper should be read not only by students, but, and more usefully so, by architects themselves, and by each and every architect, and re-read and committed to memory; and if I have considered it necessary thus to signalize it, it is precisely because under its present heading of "Students' Department," it may not appear to appeal as it really does to the attention of the professional members.

Architects, I say, should read this paper and act up to its suggestions, for my extensive term of experience enables me to say that all the suggested difficulties have happened and more than once during my time, and the "my wife" element is, as Bousfield says, creative of any amount of trouble; as well the fact of firms disowning responsibility in the case of a not legally authorized agent.

The article "Builders' Exchange, Why?" is also a well timed one, and, in a word, the whole issue is made up of readable, interesting matter.

CHAS. BAILLAIRGE,
Consulting Engineer and Architect, Quebec.

TO PROTECT IRON STRUCTURES FROM RUSTING.—Mix one part of quicklime with five parts of water, stir it up to allow the lime to settle; then pour off the clear water, and mix the lime with sufficient olive oil to make a thick cream, and paint this over the iron surfaces to be protected.

ONTARIO ASSOCIATION OF ARCHITECTS—TORONTO CHAPTER.

The regular and annual meeting of the above Chapter, was held at the School of Practical Science, on the evening of Monday, April 10th. Mr. Helliwell occupied the chair.

The report of the Secretary-Treasurer was read and adopted. It showed the Chapter to be in a healthy and prosperous condition.

The chairman presented an address, dealing with matters of interest to the profession which occurred during the past year. He congratulated the members on the great improvement in business and accounted for the small attendance at this meeting by the fact that most of the members were so busy as to have to work in the evenings. He pointed out the importance of the architects being prepared for an increased amount of work by exercising thought and study, and by thus turning out better work, reap the benefit of public appreciation. He deplored the fact that there were still citizens of Ontario who thought it necessary to go out of the country for professional advice in connection with building operations, and trusted that the time was close at hand when the very largest operations, without exception would be trusted to our architects. He thought that Ontario architects should at least be given an opportunity of showing what they could do in every case before foreign advice was sought. The matter of competitions was touched upon, and a recent competition in which the conditions were not in accordance with the principles of the Ontario Association of Architects, and for which a ridiculously small number of architects had entered, was cited as a matter of congratulation to the profession, as it indicated that the day of irregular competition was past. He made a strong appeal to all the architects of the province to stand loyally by the Ontario Association of Architects, which body he claimed had done much to further the welfare of the profession, and which from all indications promised to do even more in the future. The Toronto Chapter too had been the means of bringing the local members together, and he was sure that a better and more contented feeling existed between the architects, as a result of the Chapter meetings.

The address was much appreciated by those present, and Mr. Helliwell was warmly applauded.

The meeting adjourned after seeing a number of most interesting lantern views, taken in the West Indian islands, thanks to the kindness of Mr. Wright and Mr. Harkness, of the School.

IMPROVED BUILDING REGULATIONS.

THERE is noted a disposition on the part of municipal authorities in the United States to pay greater regard to regulations governing the erection of buildings. In Chicago, Boston and other cities a limit has been placed upon the height to which new buildings may be erected, thus effectually checking the further development of the sky-scraper style of architecture. For the purpose of determining who is the actual owner of the land and building and aiding to fix responsibility for violations of the building law, a regulation has recently gone into operation in Boston which requires the owner to sign each application for a building permit. The application must also be accompanied by a deed of the property or a certified copy thereof. Permits will no longer be granted, as in Canada, on applications signed by the architect and builder.

TESTS OF FIRE-RESISTING MATERIAL.

At the station of the British Fire Prevention Committe, Regents Park, London, Eng., a test was made on Feb. 15th last to ascertain the fire-resisting merits or otherwise of a floor by the Expanded Metal Company, Limited, London, and to record the effect of a smouldering fire of fifteen minutes' duration, of a temperature not exceeding 600 deg. Fahr., followed by a fierce fire of one hour, gradually increasing to a temperature of 2,000 deg. Fahr., followed suddenly by the application for three minutes of a stream of water, and the consequent rapid cooling.

The area of the floor under investigation was 100 feet superficial in the clear (10 feet by 10 feet). The floor was loaded with 140 lbs. per square foot. The time allowed for the construction and drying of floor was three months (winter), and the result of the test was that the plaster ceiling below the floor remained intact until the application of water. There was a slight deflection of floor and ceiling. The concrete of floor was slightly and superfically cracked. The fire did not pass through the floor. The chamber was constructed of stock bricks, with lime mortar, and measured 10 feet by 10 feet internally. The ceiling of the floor tested was 7 feet 6 inches above the pavement of the chamber. The hut was roofed in with galvanized iron. The door opening on the south side measured 2 feet 6 inches by 6 feet 6 inches, and was closed by an iron sheathed wooden door. The fuel used was gas produced at the station, and the supply was regulated by valves and dampers. The gas was admitted through two mixing chambers of firebrick, each 10 feet by 3 feet super. Two Roberts-Austen pyrometers were used for recording temperatures, the first to take a continuous record and the second to take four observation records. The load was of pig-iron distributed evenly on the surface of the floor.

The system adopted for construction of the floor tested was as follows:—On November 14, 1898, three rolled steel joists, 6 inches deep, 3 inches wide, 14 lbs. per foot, were put across the chamber. They ran north to south and rested on the 4½-inch set-off. The two outer joists were placed 1 inch from the east and west walls respectively, and the third was placed in the centre, making the distance between the centres of the three joists 4 feet 9½ inches. Provision for air was made by cutting holes 4 inches by 4 inches between the floor and ceiling in the exterior walls.

On November 16 three wooden bearers were put up in each bay, 3 feet 4 inches centre to centre, by 6 inches deep, 2 inches thick, and covered with 1-inch boarding, as centering. On the top of the centering and covering three-quarters of the entire surface of the floor expanded metal was laid, of the kind known as 3-inch mesh, ¼-inch by ⅛-inch strand; at the centre the metal overlapped 18 inches. At the north-east corner a quarter of the area was covered with ¼-inch by three-sixteenths inch metal, same mesh as before.

On the same day the concrete floor was put in. The cement used was Portland. It was not specially selected for this test, but was delivered in the ordinary course of business. The furnace ash (or cinder) came from gas works at Bank Hall. One cubic yard of furnace ash (or cinder) broken up small enough to pass through 1½-inch ring was placed on a platform prepared for that purpose, and then covered with four sacks of cement, each sack conaining two bushels. The material was turned over three times dry. The concrete was then divided into four equal parts for convenience of mixing, and one part mixed at a time. The quantity of water used was 58·18 gallons for the whole, and the concrete was well mixed. The concrete was then carried in pails on to the centering and laid over the entire surface, great care being taken to have the meshes of metal well filled. The concrete was trodden down or beaten with the flat side of an ordinary shovel. The concrete was put in 3 inches thick.

On the same day (November 16) while the concrete was still damp, one half of its upper surface (west side) was covered with ½ inch cement and sand in equal proportions, similar cement being used as for the concrete. The sand was good, sharp, unwashed pit sand. On the following day (November 17) the remaining half of the floor (east side) was covered the same proportions of cement and sand being used. The total thickness of concrete and cement was 3½ iuches.

On November 28 the centering was taken down.

On November 30 the expanded metal for the ceiling was put up. Bars ⅞ inch by ¼ inch thick were placed at right angles to and below the joists, 12 inches centre to centre, supported by steel clips 3-32 inch thick by ¾ inch wide, which were secured to bottom flanges of the joists. The expanded metal was then secured to bars with steel clips. The metal lathing used for the ceiling is known as ⅜ inch mesh, 3-32 inch deep in strand, Siemens-Martin steel.

On December 5 the ceiling was plastered with coarse stuff, ½ inch thick, below the expanded metal, the materials being mixed in the proportion of 1 of lime to 2 of sand with about 1 lb. of dry, long, well-beaten hair to every 3 cubic feet of coarse stuff, the coarse stuff being brought ready mixed on to the ground.

On February 14 the gas was lighted in the hut at 1.30 P.M. and kept very low until the test began. The roof was removed in the afternoon. The floor was loaded with pig-iron, equal to an evenly distributed load over the entire floor of 140 lbs. per square foot.

On Friday 15 the test was undertaken. The follows is the log of the test:—

At 2.40 P.M. the floor and ceiling were intact. At 3.25 P.M. vesiculated water vapor from the evaporation of water remaining in the concrete commenced to rise from above the concrete on the south side. At 3.55 P.M. evaporation showed itself strongly from all over the floor. From 3.10 to 4.10 P.M., at ten minutes interval, the surface of the ceiling was viewed from the observation hole. No change in the floor or its ceiling was observed. At 4.10 P.M. the gas was shut down and the door opened. The ceiling was intact. A slight deflection of the soffit was observed. From 4.13 to 4.16 P.M. a jet of water was applied, the pressure ranging from 40 to 20 lbs., gradually decreasing. On application of water to the ceiling, the portion of the plaster struck immediately fell down—the portions not touched remained in position. From 4.10 to 4.25 P.M. the temperature rapidly decreased. At 4.25 P.M. the test was closed, the floor, excepting for the plaster referred to, remaining intact.

On February 16 two photographs were taken of the floor from below. Some fine cracks in the underside of the concrete are observable from these. On February 16 the deflection of the centre joist was measured and found to be 1⅜ inch at the centre of joist. The eastern joist was deflected 5-16 inch at centre. The western joist was not affected. On February 21 the iron load was removed. Some fine cracks were observed in the cement surface of the floor. They did not penetrate the coating of cement. On February 23 a general photograph of the ceiling was taken from below, and likewise a photograph of the floor from above. On February 24 the floor was further examined, and it was found that the fire had not penetrated the floor at any point. No further observations were made.

MURAL DECORATION.

Mr. G. A. Reid, R.C.A., has been pretty constantly engaged for several months past on the mural decorations for the new Municipal Buildings at Toronto. A few days ago, these decorations were placed in position, and the effect is most satisfactory. The final touches are now being put to the work, and the public will have an opportunity of inspecting the same at an early date. In our May issue, we hope to be able to present to our readers illustrations and a further description of this important work.

ONTARIO ASSOCIATION OF ARCHITECTS.

The following circular has just been issued by the Registrar to the members :

"As you are aware, at the last Convention of the Ontario Association of Architects, held in January, 1899, a Special Committee was appointed to confer with the Council as to the best means to be taken to improve the condition and increase the prosperity of the Association.

The Committee in conference with the Council, is of the opinion that action should be taken to make Registration more attractive, and of more practical benefit to the members, to those who may register in future, and to our students. In a matter of so much importance it was thought well to have a letter sent to each member, setting forth the suggestions made by the Committee and Council and enclosing a stamped envelope for reply, so that the opinion of the whole Association may be obtained, and future action based on such opinion.

The suggestions are as follows :

1. To rent in a central situation a room, or rooms, suitable for meetings of the Association. The rooms to be kept open, for the use of members, from 10 a. m. to 6 p. m. on all week days and, on the occasion of meetings, in the evening also. The Library of the Association will be kept in these rooms, and they will be made as convenient as possible for the use of members not residing in Toronto, who may want to use them for business or other purposes when visiting Toronto.

2. To make the office of the Registrar and Libarian an honorary one, and to appoint an Assistant, whose duty will be to take charge of the rooms, library, correspondence, etc., etc., under instruction from the Honorary Registrar.

3. To hold a regular meeting of the Association one evening in each month, except during the summer, for the purpose of reading and discussing papers, etc., etc.

4. To have the proceedings of the Association recorded and issued in pamphlet or book form each year ; to the members free of cost, to all others at a price fixed by the cost of publication. This volume to contain all the papers read during the year with the discussions upon them, and full information, medals, scholarships, library, business matters, etc., etc.—all the proceedings of the Association, complete.

5. That a certificate of membership, adapted to be displayed in the offices of members, be issued, and that all members be requested to adopt the words "Member of the Ontario Association of Architects" as their distinguishing title.

6. To arrange for an annual course of popular public lectures on architectural subjects, with a view to advancing public taste in Architecture.

7. To provide a suitable medal out of the funds of the Association annually, to be competed for by students of the Association, and to found a travelling studentship, to go with the medal, by some means, possibly the following :—

To select twenty-five wealthy citizens of Toronto and to ask each to give the sum of $200.00, upon condition, that at least 20 of those asked consent. It is hoped in this way to acquire the use of a fund which, well invested, should produce at least $200.00 per annum ; this to be known as the "Toronto Travelling Studentship," and to be paid to the student who is presented with the Association medal, to enable him to travel in Europe for the purpose of studying architecture. By this means it is thought the students will be given an inducement to present themselves for examination and registration.

8. To provide a travelling card for the use of all students travelling abroad whereby they may identify themselves as registered students of the Ontario Association of Architects and obtain the privileges which are accorded to students of art in the art galleries of Europe.

9. To make the annual fee for members resident in Toronto $10.00, and for all others $5.00, except the fee for travelling members which would be $3.00.

The Treasurer's statement at the last Convention, "That financially we would, in the course of a few years, cease to exist unless radical changes were made," should convince every one of the importance of our taking immediate steps to prevent such a catastrophe.

You are requested to give the foregoing your serious attention, realizing the importance of the matter, and to express your approval or disapproval of each item by number, and if you can suggest anything further towards improving our condition, it will receive careful consideration.

The above proposals are not intended to supply the place of the necessary amendment to our Act, which we still hope for, but are matters desirable in any event.

N.B.—Please return an answer before May 1st next."

PUBLICATIONS.

"Sanitary Engineering of Buildings" by Wm. Paul Gerhard, C. E., etc., Wm. T. Comstock, publisher, 23 Warren street, New York.

The first part of this work, which is to be published in two volumes, has just been received. Part 1, inclusive of index, comprises 454 pages, with 103 illustrations and 6 plates. The twelve chapters treat of Defective Plumbing and Sewer Gas, Traps and Systems of Trapping, Drainage and Sewerage of Buildings, Plumbing Fixtures, Sewage Removal and Disposal, Principles of Scientific House Drainage and Plumbing, Improved Method of House Drainage, Proper Arrangement of Water Closet and Bath Apartments, Sanitation in Factories and Workshops, Drainage of Tenement Houses, Testing House Drains and Plumbing Work, Simplified Plumbing Methods. The author is a well known sanitary aud consulting engineer, and writer on sanitary subjects.

A shipment of radiators valued at $2,000 was recently made from Toronto to Norway, and another valued at $1,000 to Great Britain.

The death is announced in Toronto of Mrs. Alexander Stewart, mother of Mr. Wm. Stewart, architect, Hamilton. The deceased lady came to Toronto in 1812, having been driven out of Buffalo by the British troops.

The Metal Shingle and Siding Company, Preston, Ont., have just completed the erection of a new building, in addition to their works, 112 x 50 feet, and have recently put in the necessary machinery for manufacturing a complete line of metal ceilings, interior decorations, etc., and also corrugated iron and standing seam, and other flat roofing.

ILLUSTRATIONS.

HOUSE FOR MR. BRYDON, ESQUIMAULT, B.C.—J. G. TIARKS, ARCHITECT.

WAREHOUSE OF THE E. T. WRIGHT CO., HAMILTON, ONT.—W. W. LACHANCE, ARCHITECT.

DESIGNS FOR ARTISANS' DWELLINGS, SUBMITTED IN A LIMITED COMPETITION FOR THE SHATTUCK PRIZE OFFERED BY THE MASSACHUSETTS CHARITABLE MECHANICS' ASSOCIATION.—A. FRANK WICKSON, ARCHITECT.

The author submitted with his designs to the secretary of the committee in charge of the competition, the following memorandum :

DEAR SIR,—Competition work in the midst of the year's busy season usually carries with it the liability to suffer from being somewhat hastily rushed through, and before submitting the following memoranda relative to the accompanying plans, allow me to express to your Committee regret at my inability to devote that amount of personal attention to the work which a subject of so much and universal interest demands. I refer more particularly to the details of the design, for in the general scheme adopted in the elevations, of varying the heights of the several blocks and slightly changing the design of each to avoid monotony, there lie, I believe, with proper study, possibilities of a satisfactory treatment.

I beg to briefly draw attention to the following points in the plans to which, I may say, I have paid the more attention :

1st. Comparative absence of corridors.

2nd. Privacy, there being generally but two and never more than three apartments opening off one staircase on each floor.

3rd. Every apartment having at least one aspect either on to a large court, or one of the streets, and in the majority of cases having both.

4th. Rooms so arranged that all others opening directly off the living room are easily heated.

5th. In place of laundry tubs in each apartment, there would be a set to each block, with a drying room attached, a small fee being charged for the use of a tub, hot water and the drying room, large washings with no proper place for drying being undesirable.

6th. Staircase halls heated from the same boiler as the laundries and drying rooms.

7th. Basements fitted with lockers for coal, the same being received through small pavement areas.

8th. Hand-lifts in each staircase.

CONSTRUCTION OF BUILDINGS.—The construction would be that described as "Second Class" in the Boston Building Laws, with outer and division walls of brick, partitions of framing, or preferably of the steel and metal lath type, if the cost were not too excessive, and the floors of wood, excepting the first floor of the small six storey portion in the centre of the long sides, which would necessarily be fire proof. The staircases should be of incombustible construction. The exterior would be pressed brick with terra cotta string courses, sills and bed moulds to the cornices, the latter themselves being of metal.

COST OF BUILDINGS AND RETURNS FROM SAME.—

The buildings figured up at 9 cents per cubic foot, or $5.26 per square foot for the five-storey blocks and $4.25 per square foot for the four-storey blocks would cost	$373,500
Add value of land	240,000
	$613,500

Income from rentals :

176 four-roomed apartments, at	$2.50	$440	per week	
132 three " " "	2.00	264	"	
180 two " " "	1.50	270	"	
68 one " " "	1.00	68	"	
		$1,042	"	
Or per annum				$54,184

Allowing $14,184 for running expenses, repair fund, etc., the net revenue would then be $40,000, this being 6.52% on the capital.

Yours respectfully,
A. FRANK WICKSON.

ETHICS OF DESIGN AND COLOR IN DECORATIONS.*

INASMUCH as design plays so important a part in interior decoration, I may not be out of place in making a few remarks on the ethics of that portion of our subject. Somebody has said that a plain sheet of white paper is more beautiful than any pattern or painting ever worked on it. This statement belongs to the popular class of depreciations that the incompetent have to hurl at those who attempt. If such a statement is true, it is only so in the sense that silence is golden is true. Would knowledge have advanced if all practiced golden silence? If we all had adopted the cult of the white paper, where had art come in? Fallacies are the sheet-anchor of matter-of-fact persons. Common sense (as Philistia understands it) is based upon the lack of understanding, whether pattern or politics happened to be concerned. To be satisfied with nothing is the pride of those who cannot obtain anything. Therefore, as we are not satisfied with bare walls, we must have design. If we have design we must endeavor to realize the purpose to which the particular design is applied. The first is to grasp and adhere to the fact that walls are perpendicular and that the surfaces are flat. Also, let it be continually borne in mind that, almost without exception, a room has its definite purpose. It also contains, as a rule, doors, a fireplace, windows and recesses. The wall spaces are broken up by the fittings, furniture, hangings and pictures. Therefore the continuity of the design is certain to be interfered with in the ordinary course of things. These conditions are emphatic, and must be accepted and likewise turned to advantage.

Let us briefly consider the various purposes of the various rooms. A sensitive worker is necessarily influenced by different emotions in sympathy with the character of the rooms for which the design is being prepared. It is only by realizing acutely what these are that a fit and proper result can be achieved. For the mistress of a house to superintend the culinary arrangements when attired in evening costume is quite as reasonable as to attempt to take motives suitable for a lady's boudoir and apply them to a design for a kitchen wall paper. The cauliflower and jessamine will not lie down together.

The dining room should suggest breadth, solidity and hospitality; the library a physical repose and an inducement for study ; the drawing room should be stimulating and yet refined in detail; the boudoir should express dainty forms of facile and easy invention, and conduce to the charm of confidential exchanges ; the bedroom is for slumber, therefore we do not want nightmares in the flat, nor complete oblivion, but the song of the lullaby in pattern. For the nursery and its innocent, fresh with the breath of life, what genius is too lofty to design for this humble purpose? He would be unworthy the name of "artist" who felt this work beneath him and ignored the opportunity for a never-ending influence in fancy, form and color, associated with the vastly important tairy tale or legend. What a genius of the first rank can do with a fairy story you may all see in Sir E. Burne-Jones' pictures of "The Briar Rose." The possessors of imaginative gifts, who realize their ideas both for the finer and "coarser" arts for the advantage of the little ones, give to them a groundwork of an education ; an education which is as important and permanently influential as it is unconsciously received. Or for

* From an address delivered before the Royal Institute of British Architects by Arthur W. Silver.

the same idea in the simplest materials, take Walter Crane's nursery wall papers. The charming refinement and character of these designs is only equalled by the absolutely masterly skill with which practical limitations are turned to positive advantage.

Not all parts of the house are so obvious in their suggestiveness, yet the staircase may symbolize an upward direction. Its walls exhibit large and unbroken spaces, revealing, in its various flights, rooms which have distinctive and separate uses, so the imagination may take note of such suggestions in conjunction, and thereby produce a design of stability and breadth which shall include and embrace all the others, as well as striking a key-note to the whole. Staircases need not be too archaeological. Some people treat them pre-historically with weird marble papers, or Egyptian symbols, or possibly Medieval allegories. The staircase should not be the place with a past, but the ladder for the future.

For all these purposes the design is of the first importance.

A good design really exercises an effect almost hypnotic. A designer must be a first cause for these effects. The suitability of an idea for a purpose is insistent. For instance, scullery utensils upon a grand piano decorated with gesso are out of place, and lead to unpleasantness—but not more so than a finely conceived decoration, gorgeous and full of idea, carried out in mean materials for a back passage.

So far I have dealt chiefly with form; we now approach color, a still more important subject. What methods of economic production most nearly comply with the requirements of high art (so-called)? By the requirements of high art I mean a decoration which will offer you an uninterrupted line combined with infinite possibilities of color. I think stencilling fulfills these demands. By no other means short of hand painting, whether in fresco or other material, can you give the worker so much scope to his fancy for varied color. To talk of color is practically impossible. Its nomenclature conveys nothing beyond a vague general notion. If I ask for a scheme in red, I may obtain something as hot as fire, or an effect as dry as sand would be to the mouth. Therefore, on this I must perforce be brief; and yet I should like to say something which has a very definite bearing on this matter, for if the form of design is important, surely color has far more claims.

The most joyous of designs may be saddened by color, and yet a sombre motive may be treated with dignity in a scheme of bright red, which is supposed to be most exhiliarating. I say "supposed to be exhiliarating," for, after all, it is more the association of ideas than the raw color which affects you. If we examine the rooms we live in, and the scheme of decoration appropriate to each room, one of the questions which almost naturally arises is, "Why should a dining room be always dark red?" Is it to match the underdone beef-steak which continental prejudice believes to be our favorite diet? But, on the other hand, why should a drawing room be colorless? It it thus a foil to the conversation, which is often highly colored? Nor need a breakfast room be too simple and virtuous. The early morning suggests innocence and candor, it is true, but it brings also letters and depressions. Gay colors seems to me as needful to begin the day as to end it. A sunrise is often as charmingly schemed as a melodramic sunset.

Ought we not at this time to consider very seriously the relative positions of English artists as designers and colorists? Latterly, the pure invention of pattern which the designers of this country have evolved has attracted European attention. I say this because I know it, and am proud of it; for even in my own humble sphere the manufacturers of almost every European nationality have given me commission for goods, ultimately to be disposed of in the English market and their own. But this is not sufficient. I firmly believe we do "hold the field" above all nations for originality and invention in design; but as regards color, that is another matter. I would not venture to claim our supremacy in that respect. A merchant can commission the English designer for something "new" in form and idea, and be sure he gets it; but when the stuff is made a designer must often own to his sorrow that his scheme of color has been greatly improved by the printer and manufacturer. Indeed, this is a matter sometimes left entirely to the buyer, the designer only supplying the outlines. This is not as it should be, and I have often wondered whether there are causes other than merely climatic reasons for this shortcoming. We have schools of design where invention of a kind is cultivated, but as for teaching pupils to emphasize the development of a finer sense of color, there seems to be none.

I am here following in the wake of my friend Alex. Millar, who, in a lecture on carpet designing given recently at the Society of Arts, called special attention to this deficiency in our national art of training. He made a suggestion that seemed to me to be of the greatest value. In fact, I cannot lay too much stress on the stupendous importance and influence which it might have if carried out thoroughly. It was that "color"—as distinct from form—should be taught as a separate subject—taught as thoroughly, and held of equal importance to form. Neither is complete without the other; but we take the one very seriously, and leave the pupil to pick up the other anyhow. For a long time after 1851, when men were supposed to have changed all this, the designing capacity of this country continued at a low ebb. During this period anything good of its sort was invariably produced abroad.

Indeed, manufacturers would hardly deign to look at an English design. Now that our designers have attracted European attention, I feel more anxious than I can well express that the onward march to the maintenance of our national supremacy in industrial design should not be crippled and hampered for the lack of that charming companion, color. Form, beautiful as it may be, is but as dry bones, the mere skeleton of an idea. It must be clothed with life, and color is to form what breath is to the body.

TO ARCHITECTS AND DRAUGHTSMEN.

THE publishers of the CANADIAN ARCHITECT AND BUILDER have opened a register in which to record the names and addresses of architectural draughtsmen in want of positions, and of architects who may require assistance. Architects and draughtsmen are invited to make use of this department, which is placed at their disposal without charge, and which we trust may be found to be of service.

Boiling paraffin is now applied to floors, especially those of hospitals, to make the wood impermeable, and unaffected by acids or alkalies. The treatment is considered effective from a hygienic point of view, and lasts for several years.

HAMILTON

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

I suppose the inhabitants of this city of undeveloped possibilities could not be expected to be alive to their interests in any one direction more than another. If they cannot be brought to develop natural resources they could not be brought to consider the necessity of the preservation of their own creations. If they will do nothing towards making Hamilton a summer resort, can it be expected of them that they should do anything to prevent the total destruction of their city by fire? And yet perhaps that is the very reason for their supineness. It certainly is no use developing a place that is expected to be destroyed. They have their fire-by-laws and they have a living inspector, who has told me that they have a pretty solid kind of city, from a building inspector's point of view. I wonder if it has ever occurred to the City Council, that after having passed and approved of plans for building—facit per alia facet per se—and after having in theory, if not in fact, approved the building when completed, if a serious fire should occur, resulting in injury or death to any of the public, the corporation is in danger of being mulcted in damages? But in the happy-go-lucky way of doing things, so very characteristic of corporations generally, it is to be concluded that if the constituents don't care, their representatives need not worry. Now Mr. Anderson is not only a living inspector but he has the advantages of youth and activity, a keen eyesight and a well developed sense of smell, and it is no doubt due to his natural capacity for his position that Hamilton should be as he says it is, so solid. No matter however, how brilliant a young man may be, he cannot be expected to shine if he is put under a bushel, and city authorities are usually more weighty than a bushel. But after all, especially with the experience of other cities before us,—by-laws cannot avert destruction by fire, especially when they are pigeon-holed and their provisions disregarded.

One clause of the by-laws says that "every elevator shall be constructed with brick walls" (sizes given) "with iron doors at each opening," the walls to be carried up 5 feet above the roof. It does not say whether the "elevator shaft" means the space occupied by the car in its ascent and descent or whether the "shaft" may be large enough to include a staircase winding round the car well, which is an arrangement so well calculated to cut off all means of escape in the event of fire. And with reference to the iron doors it does not define whether they shall be solid, of sheet iron, or of open ironwork—it is a question for the city solicitor to say whether a "grille" is an "iron door." Another clause says "or," and that little word is capable of filling us with renewed hope for our safety, until we know whether what follows it is carried out—"or shall be made with sides consisting of bars of iron open on each storey, and shall have horizontal fire proof doors on each flat, which shall automatically close the elevator opening in the floor when the building shall be heated by any fire," etc., etc. Now we have departmental stores and we have office buildings, warehouses and other places of business where the "shaft" has been taken to include the staircase and that staircase is made of wood, and where the elevators are inclosed with iron railings and no horizontal fire doors exist. Another clause says that the outer walls of "every building or part of a building" shall be of "iron, stone or brick," consequently frame gables, brick nogging, half-timbered work and such picturesque details are at a discount, but at the same time we have in the centre of the city, and newly built, a departmental store with the front of its upper story of wood, between piers of iron faced with brick. It is true the greater part between the piers is of glass—but the lights being circular headed have large wooden spandrils and abutments of wood, exposed to the elements. But what do the public care; we may all be burnt as we frequent these places but that does not trouble us; we are far more interested in the "Gore Park" (which of course is so well known I need not describe it, although it, like chickens and kittens, owes its beauty—no doubt—to its minute proportions.) However we are happy at last because the block paved triangular space which has served as a cab-stand for so many years, eastward of the confines of the present enclosed portion, is to be made into a flower bed as soon as the weather permits, and as there is nothing in the fire by-law referring to the construction of flower beds, we need not worry.

R. W. GAMBIER BOUSFIELD.

THE INFLUENCE OF THE MODERN CHRISTIAN CHURCH UPON THE ECCLESIASTIC ARCHITECTURE OF THE DOMINION.

Why has the church of the present day an evil rather than an elevating influence over the architecture of this colony? This is a question over which many a thoughtful architect must have pondered sadly enough; the contrast to be drawn between the magnificent temples that are an honor and a glory to Christian Europe, marking the devotion of her peoples, and representing as well the elevated taste, culture, and persistent effort of the clergy of the Christian church, whose buildings reveal not only the highest ideal in architectural design but the greatest of constructive skill—the contrast to be drawn between such an ecclesiastical architecture on the one hand, and the temporary, and too often trumpery and wholly inartistic, nature of church building in Canada, is indeed a painfully strong one.

In speaking of the church it must be understood as having reference to the Christian church as a whole, embodying all denominations, none escaping the reproach that is levelled against our sacred edifices—far too dignified a term to apply to the great mass of churches, chapels, meeting houses and so forth.

That the great dissenting bodies should worship in buildings in no wise calculated to inspire any other feeling than that of horror at the general disregard, sometimes amounting to an almost savage disregard, of the beautiful, is perhaps traceable to that old Puritanical creed which held it and Idolatry to be nearly akin, a creed which would appear to be still held by those who have the regulation of the building operations of these bodies. This old Puritan spirit evidences its existence in the dedication to the service of the Almighty of buildings which are mere travesties of architecture. The spirit which promotes this unfortunate objection to the beautiful is the same as that which prompted the barbarous destruction by English Puritans of an untold wealth of sculpture, carving, painted glass, pictures, tapestries, iron and brass work, etc., which had been accumulated during the long centuries when the church was well nigh the only repository of such treasures, a loss of inestimable magnitude from an art and historical point of view, the wicked and wanton destruction of which doubtless is largely responsible for the degeneration in English applied arts from which we have only comparatively recently began to recover. Until the Dissenters in the Dominion realize that the Almighty is the greatest of architects, that all His works are beautiful, and that in consequence lovely buildings, fine carving, noble sculptures, grand frescoes and indeed anything and everything in the production of which there is necessarily evidenced a strong love and patient study of the sublime in nature, cannot be distasteful to Him. I say until the truth of this is borne home to them they will continue to disfigure His lovely world with their architectural aberrations in the vain belief that they are thereby gratifying God.

But how is it with the Roman Catholic and Anglican churches? Do they in their works show that they strive to emulate the splendid example of their predecessors? Very many of the clergy of these two great divisions of the church are men who have been educated at Rome, Oxford, Cambridge, Durham—places steeped to the core in art, places in which it would seem impossible for any ordinarily observant person to live for a single year without bearing away with him a love and a reference for the grey old churches, chapels, colleges, libraries and galleries with the countless treasures they contain. But how much more

true should this be of men about to become priests in the church which created or directed, or ministers in the church which inherits these glories of mediaeval art. Any one not conversant with the facts would confidently expect every little up country parish or mission church, as well as the more important edifices to bear some impress of the splendid associations amidst which the officiating clergy were reared. So far from this proving to be the case, one finds almost as little to admire, or rather, almost as much to disgust, in the sorry apologies erected under their auspices, as in those built by those branches of the church which lack the romantic traditions and noble heritage of the Romans and the Anglicans.

Why should nearly every building committee with its priest, parson or minister at the head, deem it necessary to place tin pinnacles on wooden boxes all painted and sanded with the too evident intention of hoodwinking the Architect of the Universe into mistaking them for massive stone? It is not merely very ridiculous, but worse still, savours almost of blasphemy. Wooden walls barely 6" thick contain openings with wooden arches and, oh! shade of William of Wykeham! those openings are not infrequently filled with wooden tracery. Roofs are covered with stamped tin tiles and imitation shingles, wooden label moulds are spiked onto weather boards; wretched imitation is heaped on wretched imitation until it might reasonably be deducted from this multiplication of absurdities that the building is dedicated to a great God of Sham; one lives in apprehension of seeing hollow rustic weather boarded flying buttresses and lath and plaster fan vaulting added to this already formidable list of absurdities.

Is it necessary that church builders should ape "Gothic" in the senseless, soulless manner which poses for Gothic that is? There probably are scarce a score of architects in Europe who can successfully reproduce that lost chord, for the workmen of the middle ages carried the secret of their art with them to the grave, and the machine-made, eight-hour-a-day mechanic of these days cannot recover it; the trade unionist and the Gothic worker have no resemblance—nothing in common. It is impossible, absolutely and undeniably impossible, to invest our work in this very prosaic brand new country with the charm and mystery with which the devout builders of the Old World imbued their creations. The fault, or difficulty, call it what you will, lies with the changed times, with the altered conditions of life and thought, facts which our church builders would do well to accept once and for all, and by directing their efforts with a due regard for these altered conditions they will, in time, produce something more worthy of the age in which they work.

Architecture is the history related in stone of a nation; art and literature stamp its intellectual level and mark its standard with unfailing truth; what has the Christian Church in Canada produced in the nature of ecclesiastical architecture to save her from oblivion? Judged by the standard of our places of worship, what will be thought of the religious devotion and artistic perception of the people who were satisfied with them?

It is srtange indeed to find the Church setting an example least to be expected from such a source by substituting cheap sham for the truth; our forefathers only built just so much of a cathedral or a church as they could afford to build, adding to or enlarging and beautifying as their resources permitted; or they built a portion, the nave or perhaps but an aisle of an ambitious scheme which occupied centuries to develop; thus it is that one of the most charming of studies in the whole range of architecture is that of archæology, tracing the origin and growth, the vicissitudes, the gradual advance towards fulfilment and—decay, of an old church building. How different is the story of a modern church—rushed up with an almost indecent haste on the lump sum contract principle with one desire only uppermost, to get the job paid for; debt frequently nearly overwhelms the congregation. Sometimes a church is erected and financed on joint stock principles. Think of that! seeking heaven by means of a few shares in a Joint Stock Co.!!

Poverty is the hackneyed excuse trotted out as the cause of the present pitiable condition of ecclesiastical architecture, but in the face of all the expenditure wasted on bad imitation and on fake ornament such a plea cannot be accorded any consideration. An utter failure to realize the appropriate and the fit, a desire for decorative features at any cost, even of stability, together with an apparent reluctance to trust to the generosity or to the piety of future generations to carry on and complete any work we may commence, impels the rash erection of a work in a season which might with great advantage have been allowed a century to develop in.

That the immediate descendants of that race which has made France famous as the mother of so many great artists in stone, should be so blind to the elevating influences of art is even more astonishing than the apathetic attitude of the British section of the people, whose apathy the writer believes to be largely due to the survival of the old Puritanical feeling already alluded to. And yet it is not by their sins of omission that her church builders have offended and continue to offend, as by their infinitely more awful sins of commission—Catholics and Anglicans, Methodists and Presbyterians all show themselves nearly equally lacking in a sense of what constitutes architectural dignity, beauty and repose.

It is not so much my desire to discover or to assign a reason for this indifference as to draw attention to it and its evil results, that it may be fought against and overcome. Perishable as most of our modern buildings are, they will endure long enough to exercise a baneful influence on the habits of taste that do duty with most people for educated or cultivated taste. The more solid constructions may unfortunately remain for an indefinite period to mark the decadence of art in the oldest colony of two peoples almost equally distinguished by their mediaeval architecture and whose modern work shows every sign of a reawakening. It is not too much to say that the ecclesiastical architecture now existing in the Dominion will convey lessons only of a decidedly negative description to the future student of archaeology.

There is some comfort to be derived from the thought that our machine-made galvanized iron pinnacles, bosses, cornices and what not, will quickly perish with stamped metal shingles, ceilings and other rubbish, and as this painted and sanded "ornament" is not infrequently supported on the slightest of substructures the decay of this same barbaric "ornament" implies the possibly early dissolution of our "sacred edifices." It is impossible to hope that many of the young architects upon whose endeavors the future of Canadian architecture rests will be able to enjoy the great pleasure and innumerable advantages derivable from a few years sojourn among the works of the giants of the past, for the study of ancient buildings is of incontestable value to the student, representing as these do what has been aptly described as the accumulated experiences of past ages; but a healthy regard for the appropriate utilization of materials and a stern refusal to countenance a cheap and flimsy mockery of detail which well nigh defies repetition even in living hands working on honest materials, will do much to lift us out of the abyss into which we are fallen. When necessary to build with great economy let them learn to build honestly in those simple lines and measures which confer dignity of purpose, and leave the rest to the future. One beautiful piece of window painting is of more true worth than acres of gaudy meaningless stained glass so commonly found in Canada. Let it be impressed upon the young architect that restraint is a far finer trait than fussy effusiveness; they in their turn may do something to impress this upon the laity, and then there may indeed arise a hope for a national architecture, worthy of ourselves, worthy of the two grand races that begat Canada.

ROBERT M. FRIPP.

LEGAL.

RAT PORTAGE LUMBER CO. V. AHLBERG.—Chadwick, assignee for benefit of creditors of defendant Ahlberg, appealed from certificate and finding of local Judge at Rat Portage in a summary proceeding to enforce a mechanics' lien. The plaintiff supplied lumber to defendant Ahlberg in June, 1897, and then registered a lien against the land. There were three mortgages against the land, amounting to $1,800. Plaintiffs proceeded under section 31 R. S. O., ch. 153, against both delendants, Ahlberg having after registration of lien assigned for creditors. The lands were sold for less than the amount due under mortgages. The local Judge found that Chadwick was properly added as a party. The mortgage sale took place in November, 1897, and the assignee contends that the plaintiffs should then have proved their claim against the estate, and not proceeded with the action, because the lien had ceased to exist, and also that the mortgagees should have been made partles to the lien proceedings, and that the costs of a proceeding like this should be saddled in the estate against the other creditors. Appeal dismissed with costs.

Objection has been made by the architects of Hamilton to the city building inspector being allowed to enter into competition with them by preparing specifications and superintending building contracts.

HOUSE FOR MR. BRYDON, ESQUIMAULT, B.C.
J. G. TIARKS, ARCHITECT.

WAREHOUSE FOR THE E. T. WRIGHT CO., HAMILTON, ONT.
W. W. LACHANCE, ARCHITECT.

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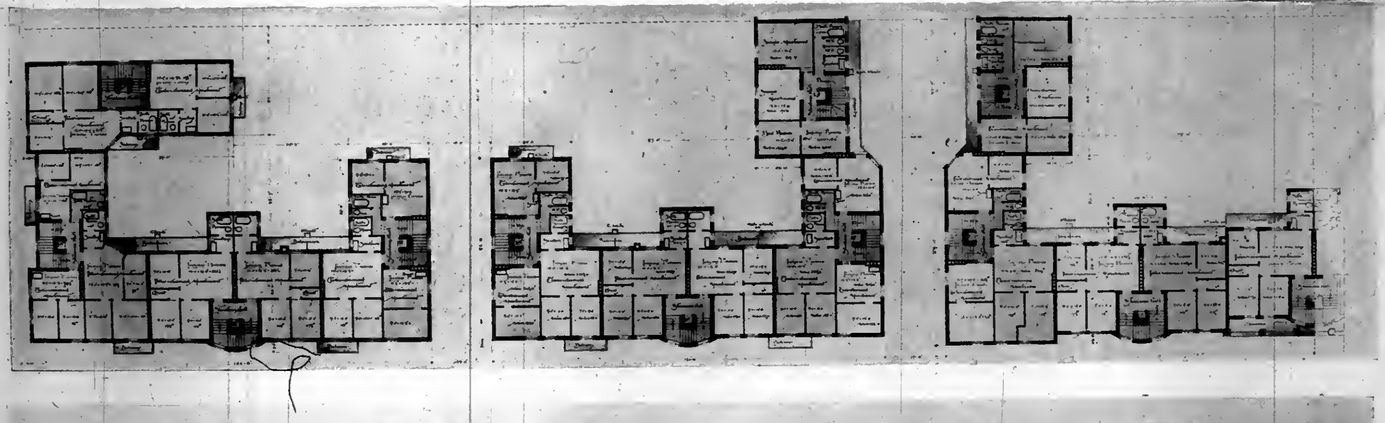


One Quarter Typical Floor Plans—Scale $\frac{1}{8}$ Inch = One Foot.

PLANS FOR SHATTUCK PRIZE FOR COMPETITIVE DESIGNS FOR ARTIZANS' HOMES (LIMITED COMPETITION).

A. FRANK WICKSON, ARCHITECT, TORONTO.

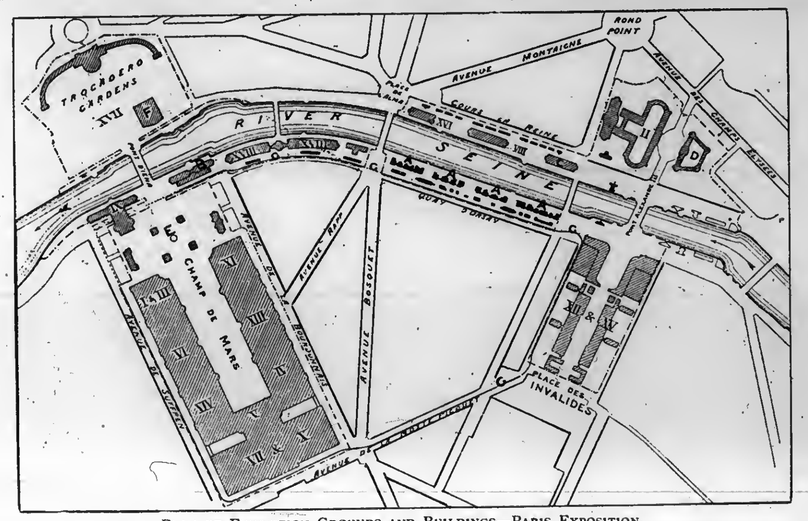
SYLLABUS OF CONTENTS OF TYPICAL FLOOR PLANS.

Rentable Space occupied by Dwelling Rooms, with their attached Bath Rooms and Sculleries—	51,580	square feet,	being	32.2307	% of the entire area of the Site.
Bath Rooms, W. C's and Sculleries common to several apartments	1,920	"	"	1.200	" " " "
Staircases	8,492	"	"	5.307	" " " "
Corridors	672	"	"	0.420	" " " "
Walls	9,752	"	"	6.095	" " " "
Partitions	2,120	"	"	1.325	" " " "
Open Spaces	85,464	"	"	53.415	" " " "
Total	160,000	= 200 x 800		99.9927	

REGULATIONS OF THE PARIS EXPOSITION.

THE Canadian Commission for the Paris Exposition of 1900 have issued a booklet giving regulations, classification of exhibits, and general information for intending exhibitors. The accompanying plan, which is herewith reproduced, shows the arrangement of the Exhibition grounds and buildings, and will no doubt be found of interest. The Exhibition will open on the 15th of April and close on the 5th of November. The Colonial building will be situated on the Trocadero grounds overlooking the Champs de Mars, not far from the Great Eiffel tower, and will cover 36,000 square feet, of which 27,100 feet has been allotted to Canada.

Forms of application for space must be returned to the Canadian Commission, Department of Agriculture, Ottawa, not later than June 1st, 1899. It is the desire of the Commission to secure the best possible exhibit of Canadian goods, and there will be no charge to exhibitors for space. Accepted exhibits from Quebec, Ontario and the west must be delivered at the exhibitor's expense at Montreal or Quebec not later than November 1st, 1899, and exhibits from the Maritime provinces at Halifax, N. S., not later than November 15th. These will be shipped to Paris by the Commission free of charge. Exhibitors are expected to dispose, in Paris, of their exhibits when these have a commercial value, as only valuable collections of objects of special character will be granted free return transportation. The exhibits are divided into eighteen groups, which are again subdivided into numerous classes.



PLAN OF EXHIBITION GROUNDS AND BUILDINGS—PARIS EXPOSITION.

Group two includes works of art, divided into four classes. Class 7 contains painting on canvas, panel, metal, enamel, china, earthenware, various glazes, by all direct processes, on oil, wax, tempera, etc.; water color paintings, pastels, cartoons for frescoes, tapestry and stained glass; drawings of all kinds. In class 9 will be placed sculpture of figures and animals in alto-relievo or in baso-relievo; models in plaster, clay or wax; originals and copies in stone, marble, bronze, wood, ivory, metal, etc. Class 10 includes drawings, photographs and models of works already carried out (public and private buildings); designs of buildings; restorations from ruins or from documents.

In group six is placed all exhibits relating to civil engineering, including the following: Building materials, such as lime, cement, plaster, artificial stone, etc.; plant and method used in the production of these materials; methods used for testing building materials; plant and method employed for earth work; plant and methods used in making foundations, public streets, etc.; models, plans and drawings relating to public works, such as water supply, gas lighting, canal construction, bridges and viaducts, railways, etc.

In group twelve is placed exhibits of decoration and furniture of public buildings and dwelling houses, including the following: Plans, designs and models of fixed decoration; carpentry; ornamental joinery; fixed decoration in marble, stone, plaster, papier mache and cartonpierre; decorative sculpture; ironwork and locksmiths' work; decorative paintings on stone, wood, metal and canvas; stone or marble mosaic pavements; enamel mosaic for walls, vaults and domes; stained glass windows; specimens of various kinds of glass used for decorative windows; models of window frames; wall papers and paper hangings; apparatus and processes for heating and ventilation; apparatus and processes employed for lighting, other than electric lights. Group sixteen includes plans and specimens of workmen's dwellings, such as single houses built by employers, workmen's flats, furnished lodgings for unmarried artisans, etc.

ARTIFICIAL SANDSTONE.

AN artificial sandstone made at Uccle-Calevoet, Belgium, is a silicate of lime obtained by imitating the supposed conditions of nature. A mixture of 80 per cent. of clean coarse sand and 20 per cent of hydraulic quicklime is placed in an iron mould, which is introduced into a boiler filled with hot water, and is kept for three days under a pressure of six atmospheres and a temperature of about 329 degrees F. The resulting block is at first soft, but hardens quickly in air. The stone is absolutely homogeneous, absorbs little water, has four times the crushing strength of French freestone, and at the cost of ten cents per cubic foot is cheaper than the natural product.

STUDENTS' DEPARTMENT.

STUDENTS' AND DRAUGHTSMEN'S COMPETITION.

THE publishers of the CANADIAN ARCHITECT AND BUILDER invite architectural students and draughtsmen in Canada to enter a competition for architectural photographs. The subject is a constructed residence costing $10,000 or under. Photographs must show a perspective view of the entire building. They must not be less than 4 × 5 inches in size, and must be accompanied by a brief memorandum descriptive of the location, site and aspect of the building and the material and coloring, together with the name of the architect, if obtainable. The photographs will be judged from an architectural standpoint as exhibiting specimens of good design—the object being to test the student's or draughtsman's knowledge of design. Photographs must be suitable for reproduction. Competitors are not restricted as to the number of photographs which they may submit.

Photographs for this competition should be sent under nom de plume, all charges prepaid, marked "Competition," addressed to the "Publishers of the CANADIAN ARCHITECT AND BUILDER, Confederation Life Building, Toronto," and must reach this office not later than 5 p.m. on Thursday, May 25th next. They must be accompanied by a separate sealed envelope containing the nom de plume and full name and address of the competitor.

The merits of the photographs submitted in this competition will be judged by a committee of the Ontario Association of Architects and the Province of Quebec Association of Architects, whose decision will be final.

The publishers of the CANADIAN ARCHITECT AND BUILDER reserve the right to publish any of the photographs submitted, and to withhold the prizes if in the opinion of the judges, a reasonable response is not made on the part of the students and draughtsmen to this invitation.

The first prize will consist of architectural books to the value of Ten Dollars and the second prize of architectural books to the value of Five Dollars. The psrsons to whom the prizes shall be awarded will have the right to select such books as they may desire within the above mentioned limits of cost.

NORMAN CONSTRUCTION.

THE skill of the Norman builders in the science of construction is attested by the strength and durability of their structures. The three essential ingredients of which they composed their walls—squared stone, rubble and cement—when combined could be equally relied upon for their firmness against pressure, or their resistance for a very long period to the operations of time and weather. The system, therefore, of bonding or tying together the ashlarwork on both sides of the wall was very rarely practiced, and there is not an example of it in a wall of great thickness. The practice would have been useless; solidity and capacity were indispensably requisite to Norman construction, and the concrete was so dexterously composed that it would have derived no advantage from the introduction of blocks in a transverse direction. For the same reason neither timber nor iron were concealed in walls thus composed. The rugged, rock-like aspect of many buildings which once exhibited a well-wrought surface of stonework mingled with the elegant ornaments of architecture proclaims the toil with which their strength had been secured. Fountains Abbey and St. Pancras Priory at Lewes are interesting and deplorable examples; but in still stronger confirmation of the durability of ancient cement, there are places in the walls of Conway and Bamborough Castles, where the stone has been forced from the mortar, which protrudes in large and prominent masses, and which are not in any perceptible degree injured by the weather. Another peculiarity occasionally observable in the construction of Norman masonry is that the angles of openings and the mouldings of piers composing the jambs attached to them are not bonded together, but that every member of the jamb throughout the thickness of the wall consists of distinct and similar layers of stone, which when not compactly joined and firmly sustained by cement, become crippled by length of time, and fall asunder beneath the pressure of their arches. The tower of Canterbury Cathedral was a remarkable instance of this imperfect kind of construction.

MAGNETISM IN BRICKS.

PROFESSOR Lawrence, of the University of Rochester, New York, has made some important observations on an unsuspected property of bricks. Some two years ago he noticed certain unaccountable movements of a sensitive magnetometer which he had placed for steadiness on a brick pier in the basement of the university laboratory. Last year, while visiting at Ann Arbor he was told that a similar phenomenon had been noticed there, and his informant half jokingly said that the bricks in the walls must have affected the needle. Professor Lawrence, remembering that in his own experiment the instrument rested on a brick pier, thought more seriously of the matter, and, on his return to his own laboratory, began a series of experiments to determine whether bricks really could be magnetic. Collecting a large number of samples of bricks of different kinds, and testing them with a delicate magnetometer, he found that nearly all red bricks, and some white ones, were appreciably magnetic, a brick of the strongest sort, a brownish variety made near Rochester, giving a power equal to that of wire as large as a knitting needle, and 1 in. long, completely saturated with magnetism. The only brick which was absolutely free from magnetic power was a white one, also made near Rochester, but a yellowish one, from some place not specified, was also nearly free from it, while another white one, from Washington, was very nearly as magnetic as the Rochester brown one.

THE CHICAGO ARCHITECTURAL CLUB.

THE catalogue of the Twelfth Annual Exhibition by the Chicago Architectural Sketch Club, held at the Art Institute, Chicago, from March 30 to April 16th, comprises 136 pages of letterpress and illustrations, the latter representing the work of architects in various parts of the United States. It is disappointing to find so few illustrations of the work of members of the Club. There is printed as an introductory article a paper on "Modern Architecture," by George R. Dean.

THE BUILDER

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Some Odd Bits of Finish.

A very simple, yet neat finish for a main stairway is shown at Fig. 1. The newel is plain, balusters square, and the stairstring unpretentious. The spandel is fitted in

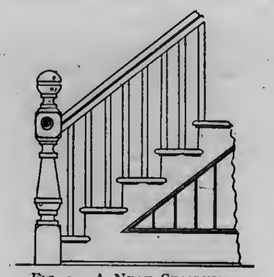

FIG. 1.—A NEAT STAIRWAY.

with matched and beaded stuff and the newel is plain, neat and effective. Fig. 2 exhibits a plain four paneled door, with machine wrought trim head and base blocks. The door panels are sunk and moulded, casings are 4½

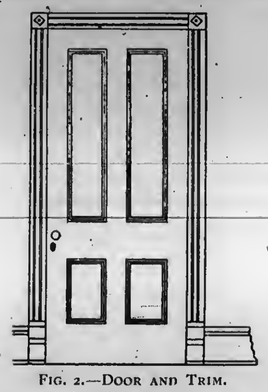

FIG. 2.—DOOR AND TRIM.

inches wide and ⅞ inch thick; head or corner blocks are 1⅛ inches thick and have a small diagonal ornament placed or nailed on them. The base blocks or plinths, are 1⅛ inch thick and the same width as the casings, the top mouldings projecting above the base. The base is eight inches wide, moulded on top. A carpet strip is nailed in against the base and is mitred around the base blocks. This door and trimming is well suited for ordinary country work or suburban cottages. In keeping with the stairway and door and finish, is the verandah finish shown at Fig. 3. The whole work is plain and within the range of most workmen. The posts are turned from 5 × 5 inch stuff, and the plate, which forms part of the finish may be formed of a 5 × 5 inch timber, or it may be built up of dressed one inch stuff. The brackets are sawn out of two inch plank with a jig or band saw. The roof may be covered with shingles or with tin or galvanized iron. The cresting, where such is required, may be cut from one inch pine or cedar and the rails and balusters may be wrought by hand or machine, out of pine, as may be thought best. The top rail may be 2½ inches thick, and the middle and lower rails may be made from two inch stuff. The frieze should be not less than an inch

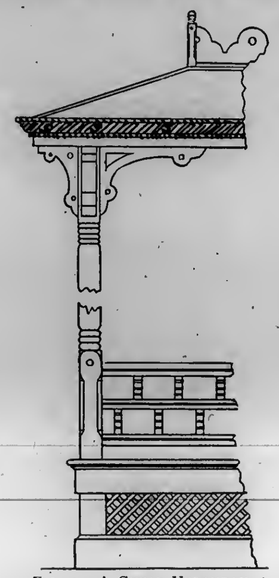

FIG. 3.—A CHEAP VERANDAH

wider than the joists and should project down low enough to receive the lattice strips. The base may be any width to suit the position. The lattice strips should be ⅜ inch thick and about 1¼ inches wide. The gutter or trough forms the finish for the cornice, and is made of tin or galvanized iron. The design is very simple, low priced, and withal attractive.

Foundation Footings.

In putting down footings it is essential that the mason get good flat bed-stones for his first course and that he lay the best side with its face on the flat earth. Spawls should not be used in packing up the first layers of footings between the earth and the stone, as this practice is sure to cause unequal settlement, and is, moreover, likely to result in more serious damage, particularly in clay grounds. Before laying in the footings, particularly where the foundation walls are not more than from two

to four feet below the grade line, the bottom of the trench should be tamped down with a heavy tamping block of some kind, in order to give a solid bed to the footings. A good tamping block may be readily made out of a piece of timber eight or nine inches in diameter and twelve or fourteen inches in length. Have the lower end cut square and smooth, bore a two inch hole in the centre of the other end into which insert a hardwood handle, leaving it about two feet long from the block. A cross-handle may be attached to this, at such height as may be suited to the person who is to use it. It will then be somewhat like a paver's rammer. If this rammer is used all over the bottom of the trench it will so harden the bottom that very little settlement will take place. The first layers of footings down, the use of spawls is, to some small extent permissible, but judgment should be exercised in their employment. If the wall is to be built on a solid sandy bottom, tamping will be unnecessary, as a foundation of sand is as good as can be desired, providing it is not disturbed by the removal of the earth or sand around it. The foregoing refers chiefly to common rubble work as generally employed in the construction of foundations for country buildings.

The Cellar Wall.

In many cellars where the ground is supposed to be dry and well drained, the inside of the wall often proves damp and sweaty. Generally this is caused by the earth on the outside of

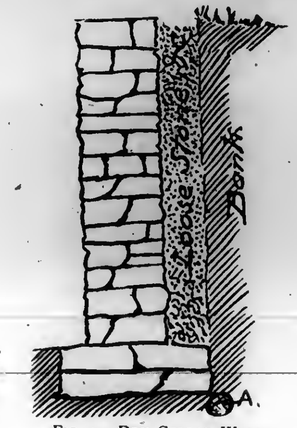

FIG. 4.—DRY CELLAR WALL.

the wall containing moisture and transmitting it to the stone forming the walls of the cellar. This fault may be prevented if proper care is taken when the wall is being built. The cellar should be excavated six or eight inches lower all around than the size of the foundation wall; then, after the footings are in place, the wall should be "drawn in" to the dimensions required, and, as it is being builded, the space between the outside of the wall and the bank should be filled in with broken stones, coarse gravel or broken bricks, and this filling continued until the grade line is reached, as shown in Fig. 4. This plan of making a foundation where there is to be a cellar, will, to a very great extent, insure dry cellar walls; but, should the earth be of a moist nature, it might be as well to lay a course of weeping tiles around the bottom of the footings as shown in the cut at A. These tiles need be no other than ordinary field tiles, laid butt and butt together. This precaution will insure a dry cellar on high land. The loose stones will allow all the wet to drain from bank down to the footings before it can reach the stonework, and if it cannot drain away from that point it will be caught and carried off by the weeping tiles. The extra expense of building a cellar wall in this manner, over the usual method, would be a small matter compared with the advantages and comfort derived by having a dry healthy cellar.

Fitments For Pantry.

Every house has, or ought to have a pantry in it, situated near the kitchen, and for economy, labor-saving and sanitary reasons, this pantry should receive much more attention than it usually gets from either the designer or the builder—and we might also add, the owner. A pantry should be well lighted, should have some means of thorough ventilation, and should be fitted up inside with ample shelving, drawers, spice nests, bins, and baking boards. There should be a nest of small drawers for spices, and the drawers should be lined with tin, and for some special ones, drop covers should be provided. There should be a case of drawers, made especially for coffee, tea, sugar, rice and other groceries that are in every day use. There should be wide shelves and narrow ones, some specially designed for canned goods. No paint whatever should be employed inside the pantry; a clean pine finish being the very best that can be done, that is to say, fit up the pantry altogether in white pine, and leave it untouched by oil or paint. If the door and window trimmings must be finished in something, apply a coat or two of good shellac varnish on the bare wood. Shellac leaves no taint or disagreeable smell after it. All shelves and drawers should be so arranged that they can be taken down or out of their places, scrubbed or cleaned, and exposed to the sun for awhile. This will not require much ingenuity, as the shelves may be left loose on their bearings. Where possible, the shelves should rest on iron brackets that have been either bronzed or japanned. The nailing of cleats against the wall to carry the end of the shelves, should be avoided wherever possible, as the cleats often have ledges for dust and dirt to rest upon. Pantries should not be wainscoted, nor should the base be very deep, for wainscoting and base offer opportunities for mice to burrow in. Where it can be afforded, the walls should be plastered with a mortar containing a large percentage of Portland cement. Rats or mice cannot cut through a mortar of this kind in like manner as through ordinary lime mortar. The plastering should in all cases run down to the floor, and the floor itself

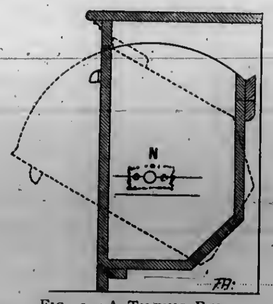

FIG. 5.—A TILTING BIN.

should be formed of concrete and cement. There should be one or two tilting bins in the pantry for holding flour or oatmeal. As a rule these "tipping

bins" are not known so well as they ought to be, and the illustrations given herewith are presented in order to show the construction and enable any intelligent mechanic to understand their anatomy. Fig. 5 shows a method of construction where the bin is swung on a pivot, the pivot being shown at N. This pivot or pin may be formed of hardwood, or it may be an iron teat screwed to the side, being first riveted into an iron plate provided with screw holes. If the pivot is of hardwood, it may be inserted from the outside through the case and the bin in such a manner that it may readily be taken out so that the bin proper can be moved at will. The pivot must be placed a little to the front in order to admit of the bin swinging back properly to its place. The dotted lines show the bin when it is tipped so that its contents may be got at readily, the shaded line showing it when closed. Another style of tilting bin is shown at Fig. 6. This method of construction permits

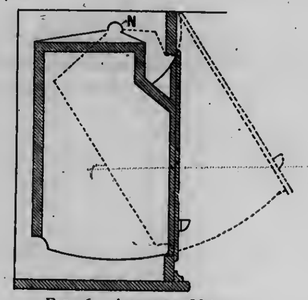

FIG. 6.—ANOTHER METHOD.

the bin to remain open without being held, whereas, that shown at Fig. 5 requires to be held slightly to keep it open, as it drops to its place automatically by force of gravitation. The method by which it is swung (Fig. 6) is shown at N. Any further description is unnecessary.

Shingling Hips.

While there are many hip roofs all over the country, there are very few of them that are finished over the hips in a proper or scientific manner. Nothing looks so ugly and unworkmanlike as a hip being finished off with two ridge boards and topped with a roll. A well shingled hip requires no ridge roll, ridge boards or other like contrivances. Fig. 7 shows a method of shingling that is

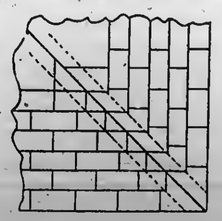

FIG. 7.—SHOWING RIDGE BEFORE IT IS SHINGLED.

handsome when finished, and quite effective in turning the water. The dotted lines show where a line has been struck on the roof-boarding, about four inches from the ridge line and parallel with it. In laying the shingles put the corner of each course to the line as shown. The tops of the shingles are then trimmed to correspond with the line, then the hip itself is shingled as shown with the grain of the wood running parallel with the ridge line as shown at Fig. 8. This method of laying the shingles excludes all danger of curling up as most shingles do that are cut to a point in the usual method of covering hips. At first sight this method has a different look, but when tried in actual practice it will be found easy enough, and every joint will be well broken. The trimming off of the top of the shingles

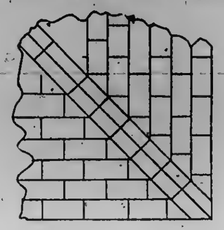

FIG. 8.—SHOWING HIP WHEN FINISHED.

must be done of course, on the line of the ridge, and this, together with the proper adjusting of the corner of the first shingle in each course, is the secret to the solution of the whole problem. In covering a roof by this method, it is always best to start the shingling of the hips on the opposite ends of the same side of the roof together, then the line can be drawn from butt to butt, thus insuring uniformity in the weathering of the shingles. A hip-roof finished in this manner always impresses the looker-on with an idea of neatness and tightness. If the roof is painted, the shingles on the hip may be made a different color to the body of the roof, though the colors should not form too strong a contrast. There are many other methods of covering hips—some good, and more not so good—which may be described and explained in future issues of the CANADIAN ARCHITECT AND BUILDER.

COATINGS FOR DAMP WALLS.

THE Plumber and Decorator is authority for the following:—The wall must be thoroughly cleaned and the plaster renewed if found to be impregnated with so-called "wall nitre" or efflorescence. The surface is then brushed over twice with a 50 per cent. solution of waterglass (silicate of soda), followed after a thorough drying with three coats of the following mixture: 100 parts of mastic dissolved in an equal weight of absolute alcohol; 200 parts of gelatine dissolved in 1,000 parts of water by cold steeping for six hours and subsequent boiling; 100 parts of 50 per cent. spirit; and a hot solution of 50 parts of ammoniacum in 250 parts of 50 per cent. spirit, the whole being well stirred and kept warm over the fire for five minutes. It should be freshly prepared for use. When this coating is dry it is overlaid with a coat of oil, or oil-lacquer paint. The sweating or efflorescence of fresh brickwork may be prevented in a similar manner, but substituting distemper or limewash for the oil paint. Newly built walls intended to be prepared can be prevented from sweating by two or three coats of the gelatine solution, which will preserve the paper from discoloration; and dirty patches arising from smoke, soot, etc., in kitchens and corridors can also be covered over with the same liquid, and so kept from showing through the fresh coat of paint.

Carmine is readily affected by heat, turning to dull brown, and metallic salts have an injurious effect upon it. Exposed to strong light it is not permanent, fading away completely in less than six months, unless well protected.

MASTER PLUMBERS' BANQUET.

A JOLLY evening was spent at the banquet given at McConkey's restaurant by the Toronto Master Plumbers' Association, on the 7th inst. There were present about one hundred persons, including representatives of the Hamilton and London associations, and of the manufacturing and supply companies. Among those in attendance were noticed the following:

J. H. Wilson (president Toronto Association), W. G. Ritchie (secretary Toronto Association), John M. Taylor (manager Dominion Radiator Co.), W. H. Meredith, W. H. Meadows, Francis Blackburn, Geo. W. Verral, W. Walker, S. McCord, Donald Q. McCulloch, David Carlyle, Frank Maxwell, George Clapperton, Samuel S. Clarke, E. A. Rogers, J. D. Ritchie, W. B. Anderson, Dundas C. World, A. H. Richardson, C. M. B. World, Adam Taylor, Robert A. Morrison, A. S. Bates, R. T. Robinson, E. H. Roulitt, T. Worthington, Samuel Muirhead, D. J. Glynn, W. B. Malcolm, J. Matthews, W. J. Spence, W. A. Fenn, James M. Sinclair, Harry R. Flett, George H. Cooper, L. L. Anthes, Alex. Fiddes, Charles E. Morrison (James Morrison Brass Mfg. Co.), J. Edward Fisher, Bert Harvey, A. Taylor, John J. Main, M. P. Huffman, Wm. Mansell, S. Wright, James Sherlock, C. H. Mortimer (CANADIAN ARCHITECT AND BUILDER), D. O. McKinnon (Hardware and Metal), A.

THE CHAIRMAN,
Mr. James H. Wilson, President Toronto Master Plumbers' Association.

McMichael, W. S. Jackson, A. W. Mann, J. R. Foster and S. Topping (the James Robertson Co.), Henry Hogarth (Fiddes & Hogarth), F. J. Taylor (the Gurney Foundry Co.), M. R. Wright, J. Wright, James Ellacott, L. B. Spafford, Fred. H. Pim, H. W. Anthes (Toronto Foundry Co.), Joseph Wright, J. H. Patterson (Toronto Hardware Co.), Fred. Armstrong, A. S. Purdy, A. E. Burroughes, J. L. Pincombe, C. E. Pickard, John T. Aggett, James B. Fitzsimmons, Benjamin Kirk, P. Davy, Toronto; W. J. Clark (president Hamilton Association), R. Rogers, James Stewart, Charles E. Marks, Geo. H. Taylor (Gurney Tilden Co.), Hamilton; William Smith (president Dominion Master Plumbers' Association), F. H. Leigh (secretary London Association), B. Noble (treasurer London Association), London; Alex. Saunders, Goderich, Ont.

Mr. Jas. H. Wilson, President of the Association, occupied the chair.

Letters of regret were read by the Secretary from Messrs. E. H. Russell, J. A. Johnson, C. F. Needham, Joseph W. Chambers, J. Hazlett, Jas. Greenway, W. H. Heard, London; J. W. Hughes, Montreal; J. McKinley, E. B. Butterworth, John Higman, John O'Neill, Ottawa; A. Chatfield, St. Catharines

The company first turned its attention to the following:

MENU.

Cream a la Princess

HORS D'OEUVRE

Lettuce — Spanish Olives — Radishes

FISH

Filet de Sole, Plumbers' Style — Pomme Parisienne

ENTREES

Sweetbreads aux Champignons
Tenderloin of Beef a la Lead Pipe Cinch

VEGETABLES

Pomme Chateau — Green Peas — Creamed Corn
Salade de Saison

DESSERT

Surprise Ices — Assorted Fancy Cakes
Wafers — Fingers — Meringues
French Decorated Pastry
McLaren's Imperial Cheese — Black Coffee—Steam Heated

Following which came a brief list of toasts, interspersed with music vocal and instrumental. The health of Her Majesty and the Governor-General having been pledged, accompanied by the singing of the National Anthem and The Maple Leaf, the glasses were charged for a toast to "The Dominion Association," with which the chairman coupled the names of Mr. Smith, of London, President of the National Association, and Mr. W. H. Meredith, of Toronto (both of whom were unanimously declared to be "Daisies").

Mr. Smith launched out into reminiscences, saying that he could remember when there were only four plumbing shops in Toronto (a voice—"Where did you buy your iron pipe?"), while now there were said to be 97. Presuming this to be a correct estimate, there should be a larger representation of the trade present on this occasion. He invited every plumber, whether a member of the Association or not, to attend a meeting to be held at 2 p.m. on the following day, when he would be prepared to talk about the Dominion Association. At 4 p.m. they would be pleased to meet the manufacturers to discuss matters of importance to all concerned.

Mr. Meredith assured his hearers that the National Association was in a good, strong condition from end to end of the Dominion, and working unitedly for the benefit of the trade and the Manufacturers' Association. He emphasized the invitation extended by Mr. Smith to attend the meeting to-morrow.

In response to the toast to "The Dominion Supply Association," Mr. A. Saunders, of Goderich, said he was once a plumber, and had to shape traps with a dresser and lay traps for customers. He referred to the plumbers as the representatives of a noble profession, and counselled them to set before them a high aim. He had lately been studying the history of the excellent plumbing work done in ancient Rome (a voice—"Any plumbing inspectors?"), and in a sense regretted that in the present day there was no incentive to the workman to do such work. Modern machinery produced everything ready-made except contracts; considerable individual effort was still required to make them. The present had been aptly described as a "growing time" in Canada; there were dollars for the plumber, and he should see to it that they found their way to his pocket.

Mr. J. M. Taylor, manager of the Dominion Radiator Co., referred to the fact that 21 years had slipped away since as a lad he started in the plumbing supply business with Mr. James Morrison, who was the father of the business in Toronto. The Manufacturers' Association was so harmonious that they only required to meet once in fifteen months. Mr. Taylor concluded by rendering

in excellent style a recitation, in which some clever hits at well-known plumbers were introduced.

Mr. Anthes, of the Toronto Foundry Co., who was greeted with "Daisy Shaker Just Now," said he had some good news for the plumbers. In Montreal a few days ago the manufacturers of soil pipe had raised prices 20 per cent. He remarked ironically that the plumbers should now raise their prices from 25 to 30 cents per hour.

Mr. Patterson, of the Toronto Hardware Co., assured his hearers that his firm always made it a rule to have a 4-inch hole in their pipe. He hoped the plumbers' banquet would be made an annual affair, so that the manufacturers and the members of the trade might become better acquainted.

Mr. Geo. Taylor, of the Gurney Tilden Co., expressed his regret of the unavoidable absence of Mr. Tilden, and wished success to the Plumbers' Association. Mr. Chas. Marks, of the same company, in lieu of a speech, favored the company with a German drinking song.

Mr. McMichael, manager at Toronto of the James Robertson Co., in response to repeated calls, also briefly responded to the toast.

The toast to "Our Guests" was enthusiastically received, and brought forth a number of interesting replies.

When Mr. Clarke, President of the Hamilton Association, rose to speak, some inquisitive individual inquired "Where's the mountain?" and subsided on being assured that it was in its old accustomed place. Mr. Clarke stated that while the Hamilton Association was as yet in its infancy, it nevertheless included in its membership about all the bona fide plumbers of the city. Previous to its formation the trade was in a very bad condition. Mr. Clarke was followed briefly by Mr. Stewart, of the firm of Fairly & Stewart, another representative of the Hamilton Association. Mr. Roger, another member, said the Hamilton Association owed much to the untiring efforts of Mr. Clarke.

Some wit cried "Remember the Maine!" as Mr. John Main of the Polson Company took the floor. After remarking that the plumber was envied when he comes to collect his bill and admired when the pipes freeze, Mr. Main secured release from further speech-making by telling several funny stories.

Mr. Maxwell, President of the Journeymen Plumbers' Association, hoped the good feeling at present existing between the master and journeymen plumbers would continue. The master plumbers should meet for consultation the journeymen as well as the manufacturers. The National Association of Master Plumbers of the United States at its recent meeting had appointed a committee to confer with the journeymen. Why not have such a conference here? The apprentice question and many other matters demanded consideration and adjustment.

Mr. Leigh, of London, and Mr. Anderson, of the James Morrison Mfg. Co., responded briefly.

The city plumbing inspectors, Messrs. Kirk, Meadows and Copping, replied on behalf of the toast to "The Medical Health Department." They bore testimony to the improved relations now existing between the Department and the plumbers, and to the fact that they had least trouble with the men belonging to the Plumbers' Association. The more associations there were, and the higher prices went, the less trouble the inspectors would have. Mr. Copping suggested that there would be a great saving in expense and trouble if the plumbers had testing machines and made it a rule to test work before sending it out.

The proceedings closed with votes of thanks to Mr. Joseph Wright and his coadjutors on the committee for their successful efforts to bring the various branches of the trade together under such pleasant auspices. The following gentlemen composed the Banquet Committee: Joseph Wright, chairman; W. G. Ritchie, secretary; A. Purdy, Wm. H. Meredith, Mungo P. Huffman, K. J. Allison, C. E. Pickard, J. B. Fitzsimons, Henry Hogarth, J. S. Bates, W. Mansell; and they are to be congratulated upon the success of their labors.

At intervals during the evening songs were sung in capital style by Messrs. Bert Harvey, W. G. Ritchie and —. Matthews. Mr. Spafford also gave a humorous reading.

It is understood to be the intention of members of the Supply Association to tender a return banquet to the Master Plumbers at an early date.

CONDITIONS IN THE PLUMBING TRADE.

ONE of the objects in view in getting together the Master Plumbers and representatives of the manufacturers and dealers in plumbers' supplies at the banquet held last week, was to give an opportunity of adjusting certain difficulties existing between the plumbers and supply companies. It will be remembered that at the Plumbers' Convention held in Quebec last year, the members of the Supply Association signed an agreement that they would not sell goods to any but legitimate plumbers. Complaint has of late been made that some of the supply houses were violating the terms of this agreement. On the day following the banquet, a meeting of the plumbers and representatives of the Supply Association was held in Toronto to discuss this matter, and we understand that the result of the conference was entirely satisfactory, the supply companies having pledged themselves to stand by their agreement.

THE IMPERIAL BRICK COMPANY.

A new company is seeking incorporation under the above name, to manufacture common and paving brick on a large scale at East Toronto. A number of well known capitalists of Toronto and Brantford are the promoters of the enterprise, which has already advanced to a point which admits of no doubt that it will be carried to successful completion. The necessary buildings and equipment will be provided at an early date, an experienced manager having already been engaged. The manufacturing appliances will be of the latest improved description. The intention is to operate the works throughout the year. The works will be situated in the midst of the clay deposit, thus obviating the expense of cartage. Shipping facilities by rail and water will also be provided. The character of the manufactured material was foreshadowed by one of the projectors of the company, who remarked that it was the intention to make a common brick which could be handled less carefully than eggs. The present would seem to be a favorable time to launch this enterprise, as a distinct revival in building seems to have set in, and stocks of common brick have run low while the demand for paving brick is said to much exceed the capacity of the present Canadian factories.

BUILDERS' ACCOUNTS.

III.

By A. O. Kittredge, F.I.A.

There remains for consideration, before bringing this series of articles to a close, the matter of a "going balance sheet," and a consideration of those facts which have to do with closing the books. A going balance sheet, however, does away with closing the books, as that term is ordinarily understood. With a going balance sheet the books are always open and always closed, and therefore it may be declared that for our purpose the first of these matters includes the last.

In all that has preceded the underlying thought has been a showing of results at every step. The culmination to be effected in this regard is the going balance sheet. At the outset the builder's attention was drawn to a balance sheet of the conventional form, the illustration employed being of the simplest possible character. Resources were put in one group and liabilities in another, and the difference between the two, it was pointed out, represented the builder's investment or his net worth, commonly called capital. A capital, and another at the end of the business period under review, showing similar items. A comparison of the latter with the former served to show whether a profit had been made and how much, or a loss and the amount of the loss. In the interval between the dates of the two balance sheets thus compared many changes of course had occurred. Some assets had been converted; the amounts in the asset column has been varied as between the different accounts represented; in one case, perhaps, there was more cash and less book accounts, and in another case very much less cash and a corresponding expansion in book accounts. In one case there may have been very small liabilities, and in the other larger liabilities. The two balance sheets simply took cognizance of the conditions at their respective dates, and indicated by the difference between the two capital amounts the net result of the transactions which had occurred. Each transaction had resulted either in a profit or a loss. In all probability some of them had been productive of a gain and others of a loss, and therefore the difference shown between the two balance sheets was composed of both profits and losses, but of

Banquet of the Toronto Master Plumbers' Association, April 7th, 1899.

going balance sheet is only the arrangement of the accounts shown in such a schedule as just described, in a form to permit constant and regular additions to them, with the opportunity to strike a balance in each account, or in all the accounts, as often as they may be desired.

There are varions ways in which this arrangement of accounts may be effected, and therefore it will be better to devote all the space at our command to a discussion of principles rather than to use a part of it for an illustration of a special method. Suffice it to say in passing that what is known as the "Balance Sheet Ledger," which is arranged in vertical columns for the necessary accounts, and in horizontal spaces for the records of given dates, thus permitting posting each day, or at other regular interval the results or totals of the business transaction, is that which is in most general use for the purpose, and which gives the best satisfaction.

Right here let us pause long enough to contrast the new method with the old. A moment's consideration of the difference between the two will serve to illustrate the special points that are to be presented. The old plan, with respect to balance sheets, as intimated at the beginning of these articles, was to make out one at the commencement, showing resources, liabilities, and net these details the usual comparison of balance sheets shows nothing.

Now with respect to the new. Instead of taking the beginning and the end of a considerable period of time for comparison, the going balance sheet presents the condition of the business at all times. Any given day may be compared with the preceding day, or a given month with a preceding month, as may be desired. The intervals recognized by the going balance sheet may be days, weeks, or months. For all practical purposes a month is the best unit. Particularly is this the case in the building business. In mercantile operations it is sometimes advantageous to reduce the period down to days. Let us now consider the form of the going balance sheet.

Suppose that we have the accounts composing our balance sheet at the beginning of the business period, and that these are spread out in a horizontal line, that is, instead of the amounts of the accounts being opposite the names in a vertical table, such as was presented in a previous article, the amounts are run along in a horizontal line, properly spaced, with the names of the accounts they represent written directly above them. Each transaction that is made results either in a loss or a gain.

We cannot do business without making an expense. Every change that we make in our assets, for example, like paying cash for materials, changes the balances in our balance sheet. Our balance sheet, therefore, varies day by day, in an amount corresponding to the amount of our transactions, and our assets and liabilities vary according to the profit that is being made or the loss sustained. Having the accounts, therefore, of the balance sheet spread out as above suggested, and arranged in a form that permits other amounts to be placed directly under them, thus adding to the debit or credit side of each, as the case may be, we shall be in a position to record day by day our transactions in a way to add to the figures representing our business at the outset, and to leave the amounts always in a shape to show up by the balances in the accounts the real condition of our business at any date that examination may be made.

In referring to the old style of balance sheets above, it has been asserted that what takes place between the dates of two balance sheets, made out for purposes of comparison, is lost sight of in detail, and that only the result is shown. The business has produced either a loss or a gain, but the record of that loss or gain is covered up, save only as the net result affects our capital by increasing it or diminishing it. The loss or gain, as the case may be, is the last thing shown, and we dispose of it by carrying it to capital. Now, in the going balance sheet, we must eliminate this profit or loss item, as the case may be, day by day, week by week, or month by month, according to the interval that is chosen for the purpose, but instead of carrying the result to capital, it is better to carry it to a special account, as will be explained a little later.

A balance sheet, with the amounts arranged as above described and posted to from time time, as also explained above, will be a truthful representation of our business condition, at any date it is examined, except only so far as the element of profit or loss may affect it. Therefore, in addition to what has been described, we must manage the accounts in such a way as to take out the profit or recognize the loss, as the case may be, as often as we want to know just what our business condition is, with respect to resources available to pay our debts.

In a previous article certain diagrams of accounts were presented. For example, there was first given the formula of a contract account. Such an account is to be debited with materials, labor, all specific outlays, and its pro rata of general expenses. It is to be credited with materials left over. The net cost of the contract thus recorded, we specified, is then to be transferred to Selling Account. Selling Account, in turn, is credited with the contract price and extras of the same contract. The difference between the two sides of Selling Account then is the profit or loss, as the case may be, that we are making upon our work. This principle of determining profit and loss result must be carried into our balance sheet to the extent of closing up our accounts as fast as our contracts are completed, and taking out of those accounts which represent our transactions—namely, those which take the place of the old Mercandise Account—whatever there is of profit and loss, and carrying it over into the accounts which are specially arranged for the purpose.

I appreciate the difficulties under which I am laboring in endeavoring to make the builder's bookkeeper understand this matter without numerous illustrations and a very much longer description. However, at least one diagram is necessary to make the point sufficiently clear for the bookkeeper's use, and that is presented herewith. It may be described as a chart of accounts necessary to the building and contracting business, for conducting a going balance sheet and for keeping the business so analyzed as to show the profit or loss on each individual job, the profit or loss on the entire business, and the builder's position with respect to resources and liabilities at all dates.

The accounts necessary to open, it will be seen by reference to the chart, divide first into two leading classes, namely, the accounts of the transactions and the accounts of the proprietorship. It is necessary to discriminate between these two. The lack of keeping these classes separate and distinct has before now, in many cases, resulted in great confusion and the worst of jumbles in account keeping. The transactions are one thing and the ownership of the business another. Each requires its own separate accounts.

The proprietor or owner is responsible for the expenses of doing business, by which is meant those expenses incident to a general oversight of the transactions and which are outside of expenses of production, or those that by rights are chargeable to the several jobs in hand. In turn, having borne the expense of the business, and taken all the risks, he is entitled to the gains; or, being responsible for the management, he is obliged to suffer the loss if it is running behind.

A comparison of expenses of doing business with the losses and gains incident to that business shows the net profit of the business or the loss of the business, as the case may be. If the business is making a profit, then there is a credit to be carried to the account called dividends and divisions, through which the profit is divided among partners, paid out in dividends, or withdrawn by the single proprietor, as the circumstances may be. In turn, if the business is running at a loss, then capital is being impaired, and therefore there is a charge against impairment account. If a profit is being made and is not being withdrawn in full, then capital is being increased and there is a credit to surplus account. Since impairment is a debit and surplus is a credit, these two accounts are combined in one called "Impairment and Surplus."

This scheme of analysis answers whether the business that is being conducted is that of a single individual, a firm, or a joint stock company. Capital, it is argued, should be considered a fixed amount, and to be left in the account without variation, except as additional capital is supplied, or as a portion of the capital is withdrawn. Whatever the business produces over and above the profits that are taken out should be carried to the surplus account, thus always maintaining a statistical showing of what the business is doing.—The Bulletin.

USES OF CEMENT.

The field for the employment of cement is constantly and rapidly expanding. In recent years large quantities of Portland cement have been used in Canada in the construction of sidewalks and concrete foundations for asphalt pavements for streets. It has also entered largely into the construction of basement floors, and of late is finding employment to a much larger extent than formerly in the foundations of buildings, and in fireproofing systems. In Europe, and particularly in Germany, it finds a still wider range of employment. It is said that in the latter country concrete tile floors are made in artistically colored designs, and capable of resisting acids. Cement roofing tiles are also manufactured on a large scale. The higher priced tile are inlaid with various designs, the colors being ground in special machinery. The manufacturers are said to have succeeded in securing any desired shade or blend of colors. These cement tiles are said to have superseded to a large extent the burned clay tile.

THE PREPARATION OF MORTAR.

A recognized American authority, Edward Wolff, says the slackening operation should be done in a water-tight box made of boards, and so much water should be mixed in that the contents will never get dry, and a sheet of water will remain on the top to prevent access of air. If the box will not hold the entire quantity of lime required, the contents may be emptied into a cavity made in the ground close to the pan and this process may be repeated. This should be done at least two weeks before sand is added, or before the mortar is prepared for use. Slacked lime prepared and kept as stated, has been found free of carbonic acid after many years, air and gas not having been able to find access. Instead of following the procedure in slacking lime recommended above, we see in this country a faulty process adopted, which consists in loosely mixing the sand with the slacking lime immediately after water has been added and forming a dry heap on the surface of the ground, which is left lying there several weeks to give time for complete slacking before the sand is worked in evenly and the mortar considered ready for use. This heap arrangement is perfectly adapted to circulating air through a material which should be guarded against contact with air. The sun heats the surface of it, makes the air escape after it has given up its share of carbonic acid gas, while at the base of the heap and at the shady side a fresh supply enters to fill up the vacuum after it has circulated through the heap and has been robbed of its share of carbonic acid gas. That this procedure really happens in such a heap we can easily see when we place a lump of freshly slacked lime in a wine glass, and in another glass place a small quantity of material taken from a heap such as described, and which has been prepared a few days before. Fill both glasses nearly up with water, and add a few drops of muriatic or sulphuric acid to each. In the first glass nothing can be observed, while in the second glass we will see in the shape of small bubbles the carbonic acid escape, which has been absorbed by the lime from the atmospheric air circulating in the heap.

SKETCH MODEL FOR TERRA COTTA, BROWN BROS.' WAREHOUSE, TORONTO.
By W. J. Hynes, Toronto. Beaumont Jarvis, Architect.

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VOL. XII.—NO. 5. MAY, 1899 { PRICE 20 CENTS. $2.00 PER YEAR.

—THE—

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A Monthly Journal of Modern Constructive Methods.

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PUBLISHED ON THE THIRD WEDNESDAY IN EACH MONTH IN THE INTEREST OF

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Telephone 2362.

Branch Office: NEW YORK LIFE INSURANCE BUILDING, MONTREAL.

Bell Telephone 2299.

SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to foreign subscribers is $2.50. Subscriptions are payable in advance. The Journal will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrears of subscription paid.

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Fire-Resisting Mortar.

THE discovery is reported that serpentine rock, when powdered and mixed with good lime, forms a mortar that will successfully withstand heat to 1,100° F., and will not crack if subjected when at this heat to contact with cold water. The new material, besides being in the highest degree fire-resisting, is also declared to be so elastic as not to crack when the building settles and permits of nails being driven into it. It is said to be one-third lighter than ordinary mortar, easy to handle, and capable of receiving decoration.

The Palace Hotel Project.

IT is gratifying to note that the project for the erection in Toronto of a first-class modern hotel appears to be making satisfactory progress. The promoters, among whom are many of the leading financiers of the city, have been granted incorporation under the name of the Toronto Hotel Company. A meeting for organization is being held as we go to press. The attempt to interest the two great railway companies has, it is understood, been successful, and the enterprise will be entered upon at an early date.

Steel Stirrups Condemned.

PROF. J. B. Johnson, of the Engineering Department of Washington University, St. Louis, Mo., says: "The recent fire tests of steel stirrups and brick walls, which were made under my supervision in this city, show very conclusively that unprotected stirrups are extremely dangerous. These stirrups become red hot in a few minutes, and then rapidly char and burn away the end of the beam, and also bend down, so that, in from twenty to thirty minutes after the fire reaches the stirrups, the beam is dropped right out of the twisted steel by the straightening out of this bend or twist." Another side of this question is that where beams are so securely anchored as to resist the action of fire for up-

wards of half an hour, they are almost certain to cause the walls to collapse and bring about the wreck of the entire structure.

Strengthening Effect of Metallic Cores in Mortar.

In the Comptes Rendus there was published recently the results of tests made by M. Considere to determine the value of metallic cores for adding to the strength of mortar and concrete. M. Considere states that the insertion of an iron core increases by twenty times the elongation of the mortar. Tests were made with various mortars and concretes, using prisms of square section 60 cm. long and 6 cm. in the side, in which were embedded rods or wires of iron. M. Considere is of opinion that injury to buildings by the settling of foundations, unequal expansions and shocks is much less liable to occur when cores are used, and finds that wrought iron and hard steel of the kind used for rails is capable of strengthening mortar and concrete to a much greater extent than is the iron usually employed for cores.

A Spoliation Scheme.

The management of the Toronto Street Railway are endeavoring to secure right of way for a car line up University street and through or beside Queen's Park to the northerly city limits. The proposal is one which the citizens should promptly and strongly oppose. By the expenditure of nearly $50,000 two or three years ago, the attractiveness of Queen's avenue and Queen's Park was greatly enhanced. There is now at the disposal of the citizens one central spot to which young and old may resort for pleasure and rest, undisturbed by the grinding of wheels and clanging of bells. Every effort should be made to preserve this condition. There is no wish or demand on the part of the citizens for additional street car lines in this locality, which is already well served by the belt line, Yonge street and Avenue road. The proposal has its origin in the greed of the street car company, who have never shown much regard for the comfort or even the rights of the citizens. The Toronto Guild of Civic Art, among whose members are gentlemen identified with Toronto University, the interests of which are affected by this proposal, should at once take decided action in opposition to the carrying out of the scheme.

Ill-Advised Legislation.

The legislature of British Columbia during its last session seems to have been largely under the influence of the leaders of organized labor. Reference was made in a previous number to an Act passed at this session, the object of which is to prevent contracts being made with workmen residing in the other provinces of the Dominion. This must be regarded as being legislation of a very narrow sort, and calculated to check free intercourse between the people of the different provinces, and the building up of a homogeneous nationality. Another measure was passed forbidding the employment of Japanese coolies in certain industries and upon public works, which has resulted in a strong protest from the Japanese authorities to the British government, which in turn has brought the matter before the Dominion government at Ottawa, where it is now being considered. The Japanese Ambassador to Great Britain, who passed through Canada recently en route to his native land, protested against the Japanese in British Columbia being placed on the same level with the Chinese—as the former spend their earnings in the locality where they reside and conform in their dress and habits to the customs of the country. It was intimated that the retention of the new law on the statute books of British Columbia would be likely to seriously disturb the international good feeling which at present prevails between the governments of Great Britain and Japan, and likewise restrict the development of the growing trade relations between that country and Canada.

Canada at the Paris Exposition.

Mr. J. A. Radford's suggestion that the Dominion government should institute a competition among Canadian architects for designs for the Canadian building to be erected at the Paris Exposition is an excellent one. We fear, however, that it comes too late, as plans for the building are said to have been already prepared. The Hon. Sidney Fisher, on his return from France last year, stated that while in England he had inspected and approved of plans for a Canadian building, prepared under the direction of the Executive of the Colonial Committee, of which Lord Strathcona is the chairman. It was proposed by these plans to erect a building which should cover the entire space allotted to Canada, which at that time was extremely limited, but which has since been increased by an allowance of 8,000 feet of the space allotted to Great Britain. This plan, on being submitted to the French Executive Committee, was rejected, and the Colonial Committee were informed that each colony was expected to erect a small kiosk-like building. To this regulation the Colonial Committee made urgent protest, on the ground that the erection of such buildings would tend further to reduce the already too limited space at the disposal of the colonies. We have not learned in what manner the difficulty was adjusted, but the recent announcement that the plans for the Canadian building had arrived at Ottawa would indicate that an understanding has been reached, and also that, in view of the difficulties which have been experienced, there is little prospect that the government can be induced at this late date to re-open the question of the design of the Canadian building. Notwithstanding, we could have wished with Mr. Radford that the design for this important structure had been thrown open to public competition, in order that the building might rightfully represent the product of the highest architectural skill of which Canada could boast.

Methods of Cooling Buildings.

A firm of heating contractors in Toronto recently received a letter from New Zealand inquiring whether any method had been devised of using Canadian radiators for cooling dwellings during hot weather. The writer was looking about for means whereby houses in New Zealand could be made comfortable in summer as well as in winter. He had become acquainted with the excellent heating apparatus manufactured in Canada, and which is rapidly finding its way into use in many foreign countries, and his thought naturally turned in this direction when seeking a method of cooling. Unfortunately, the desired information could not be given him, for the reason that Canadians have not yet solved the problem for themselves. By the use of fans or blowers located in the basement and operated by steam or electricity, large buildings are being successfully ventilated, heated and cooled, but the method, if possible of application, has not yet been put to practical use in ordinary dwellings. The time has arrived when cooling methods applicable to buildings of this class are felt to be a necessity for those who are obliged to spend the heated term in the city. Electric fans can with some advantage be employed in houses where electric current is used for lighting, but the majority of houses are not lighted by electricity, so that the current to operate the fans is not generally available. What is required is a system by means of which cool air could be evenly diffused throughout the house in the same manner as warm air is now distributed in winter. The idea of utilizing the steam and hot water radiators for this purpose is an excellent one, and might, we believe, be found to be practicable. If we might rely upon the statement of the author of a recent article in Maclure's Magazine, regarding the wonderful expansive, cooling and other properties of liquid air, the solution of the problem would seem to be near at hand. Unfortunately, some of these statements are so directly opposed to well-known and tried physical laws that scientific minds have discounted largely the importance which the public at first attached to the writer's so-called wonderful discovery. We invite an expression of the views of architects, heating engineers, or indeed of any reader on this interesting subject of how to maintain in dwelling houses at sufficiently low cost a reduced temperature in summer.

BY THE WAY.

Experience has shown that wire nails are not adapted for use in shingling, as in a short time they rust away and the heads drop off. A correspondent of the American Architect instances the case of a church shingled less than a year ago, where the wire nails have been destroyed by rust.

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Sir Wilfrid Lawson has thus put into jingle his view of the British Workmen's Compensation Act :

"If you fall thirty feet slap bang on the street,
You'll get cash if your head be split ;
But if, cutting it fine, you fall just twenty-nine,
In that case you won't get a bit.
So the moral is this—If I'm not far amiss ;
If you are a wise working man,
If you find you've a call to accomplish a fall,
Then tumble as far as you can."

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The Canadian Club has decided to mark with memorial tablets historic land marks in and about Toronto. The Club would find their task a much easier one if the custom had prevailed among architects in the past of affixing to their principal buildings their names and the date of erection. Their failure to do so may have arisen from the modesty which is supposed to be an innate characteristic of the profession, or possibly they were over sensitive about what might be said about such a proceeding by the papers.

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George Lynch entered into a contract to build a new spire for the Wall street Methodist church in Louisville, Kentucky. The workmen disturbed a nest of hornets in the old spire. The hornets resented the intrusion by stinging the workmen so severely that some of them fell to the ground and narrowly escaped being killed. The attempt was made to eject the hornets by sulphur and fire, but it failed, while there was danger of destroying the building. The work is accordingly at a standstill, and the contractor is being threatened with a suit for damages by the church authorities for failure to complete his contract.

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The danger which constantly threatens pedestrians on the public streets from the accumulation of snow on roofs in winter was sadly emphasized by the recent death of a little girl in Toronto as the result of a snowslide from a church roof. Witnesses testified at the enquiry that on several occasions they had narrowly escaped injury from the same cause while passing the building. It was further shown that the attention of the church authorities had been called to the matter, but no steps were taken to avert the danger. I understand that the city by-laws require the owners of buildings to keep the roofs clear of snow, but like many other ordinances, this one appears to find its fulfilment in the breach rather than in the observance. Let us hope that the sacrifice of the life of a little school girl will lead to more strict compliance with the law for the future.

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Reference is made by a contemporary to the fact that the Jews were ever great builders and many of their ceremonies remind them of this art. The Passover is not allowed to pass without a reference to the brick-making bondage in Egypt. During the service the history of the Passover is related, being recounted in reply to a series of questions asked by the youngest person at table, who enquires the meaning of the unaccustomed things he sees about him. One quaint edible partaken of ceremonially is known as "Charouseth." It consists of a mixture of chopped apples, nuts, and spices, and forms a pleasant substitute for the mortar (of which it is supposed to be a reminder) used by the ancient Hebrews in building the cities of Pithom and Rameses, the two stone cities of the Pharaoh "who knew not Joseph."

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A New York contemporary, Fire and Water, has made the interesting discovery that Rome in the days of Cæsar Augustus, was ahead of Chicago, which has laid claim to being the mother and inventress of sky-scrapers. A reference to the building laws of the Eternal City shows that in the Augustan days the rage for running up excessively tall structures was so rampant that restrictive legislation had to be passed on the the subject, and the Senate enacted that their height should be limited for precisely the same reasons as are at present urged against them in New York to-day. It was proved that they darkened the streets, thereby rendering them unhealthy ; that their deterioration was also a source of danger ; and that they increased the already existing fire risks, since the growing population was hemmed in by the walls and had, therefore, to house itself in high buildings, which were overcrowded and, in case of fire, were likely to turn out deathtraps. The old Roman skyscrapers, however, were of a different type from those of Chicago or New York. Their rears towered over their fronts. The latter were 100 feet or more above the street level, while the former rose as high as from 120 to 130 feet, there being ten or fifteen stories, with a terrace-like appearance at the top. As these buildings were voted dangerous to the public safety, a law was passed fixing the minimum height of all new dwelling houses at sixty feet. The prophet knew whereof he spoke when he said that there is nothing new beneath the sun.

THE TECHNICAL SCHOOL QUESTION.

The question of Technical School education is beginning to receive the attention it deserves in this country. The question was taken up by a committee of the Ottawa Board of Trade some months ago and a report presented last March. Since then the Toronto Board of Trade has taken action in the matter and is to arrange an open meeting at Toronto next month, at which the Minister of Education for Ontario will speak. All this is as it should be and this meeting ought to be an important occasion. The whole system of production in enlightened countries is based upon the use of mechanical power and it is no longer possible to make progress without spreading the knowledge of the principles which underly its application. The question is in what way and to what extent.

There is already a Technical School in Toronto which has had a chance of exhibiting in what lines technical education should be carried on; but after some years of existence it seems to have no other idea of its mission than to be a sort of night school with scientific leanings; which seems to be attempting either too little or too much. It cannot provide all the scientific instruction which those should possess who are responsible for the conduct of important industrial undertakings, and it does not frankly profess to confine itself to teaching artisans the limited application of science in their own trades. If all knowledge of theory is not possible to those who use science in trade there must be a choice between total ignorance and partial knowledge, and there is no need to be afraid of the bugbear of superficiality. The carpenter who is instructed in descriptive geometry, for example, is none the worse if he can get the knowledge he wants without any accompaniment of chemistry. He is not even the worse if he stops in his own subject short of the point where the practical merges into the "pure." And he is certainly the better by a skill which we would call technical, and which may therefore properly be the product of a technical school.

It is difficult to speak in this matter with authority as the authorities seem to be divided. But it is difficult to regard the Board of the Toronto Technical School as authorities on the question of education. As a matter of fact their attention seems to be chiefly taken up with the question of getting themselves a suitable building. This is not only a good thing itself, but has the incidental advantage that they will by this means draw upon themselves the searchlight of investigation, for it will not become the City Council to spend $75,000 on a building for the School without satisfying itself that what is taught in the school justifies the expenditure.

It is a time for revision of the curriculum of the school by a competent inspector. It is a time also for revision of the constitution of the board. Its personnel is somewhat peculiar. There are two educationists, which is well; two architects and two stationary engineers, which is an incomplete contribution from scientific and mechanical callings; five aldermen, which is well, but also five members of the Trades and Labour Council. We are familiar with the Trades and Labour Council as legislators but in an irresponsible field; here in the character of educationists, they appear in overwhelming force, and from their constancy at meetings have the controlling power. The conduct of the school is virtually in their hands and, if report speaks truly, they appear to exercise the joy of management with very slight reference to the question of education.

There are rumors of degeneracy in the teaching of the school and the falling off in attendance this year, which is attributed by the principal to the cold weather last winter and the prevalence of grippe, is attributed by a correspondent of the Mail and Empire, who signs himself "Old Student," to the belief on the part of students that the subjects they wish to learn are not properly taught; and this correspondent says further, what is at least a proof of sincerity on the part of these students, that they have, at their own expense started classes, in connection with the Massey-Harris works, where they can learn what they want. Without admitting the principle that the taught are to dictate to their teachers what to teach them, there is in this statement at least an indication that the Technical School needs inspection. It is not difficult to find an inspector capable of judging whether the curriculum of the school is well taught, but the problem is greater than this, and is the problem which ought to be taken up by the meeting about Technical Schools which is promised for next month. What should be taught in a technical school which is intended for the instruction of young men and women intended for, or already engaged in the work of artisans? Is it their mental development that is to be aimed at, trusting that there will be results in the future; or should the effort be to give them instruction bearing upon their daily work, so that they will acquire immediately intelligence and facility in their craft? In other words, are the classes to be arranged by grades or by trades? This is a question which means plenty of work and ought to mean a good deal of travelling for some one, and means therefore a liberal expenditure of money. But, it being granted that technical education is a necessity for the prosperity of the country, there is no wisdom in sparing expense either for the establishment of a sound system or for procuring a first rate staff of teachers. Trade returns are reckoned not by thousands but by millions and, as it is trade returns that are the ultimate aim, the soundest policy is to make sure of getting them—as sure as the outlay of thousands can make us.

Who is to provide the money is another question in debate. The Ottawa Board of Trade thinks it is a Dominion affair; the Toronto Board of Trade thinks the provinces should take the matter up for themselves. If the province of Ontario should adopt the Toronto Technical School it would have to be so remodelled that it would cease to be the same school. There is, however, no reason why the Toronto Technical School should not continue to exist as the positive degree of an arrangement of which the Provincial Technical School and the School of Practical Science will be the comparative and superlative degrees.

Toronto's night Technical School, without fee, intended for the working class, will then fill without question the much needed place of a school to teach science for artizans. Not, as was before said, to teach chemistry or electrical science to carpenters, but to give them such science as they need; a knowledge of graphical methods and better formulas than, "a two by ten is plenty for sixteen feet" etc. Every artizan wants some technical training, but it is the better for being limited to his needs. Free hand drawing is useful to most workmen, but not the study of light and shade. A tinsmith needs a knowledge of development that would puzzle a prime minister, but his science practically stops there. A painter should have some knowledge of chemistry but is blessed with freedom from mathematics. A plumber ought also to have some chemistry and should add hydraulics. It is more difficult, though we have made some exceptions, to set limits to a carpenter's scientific knowledge. He touches building at all points. If he would only know enough not to make original designs, a grateful country would exalt him high in its estimation.

Outside of architecture and the building trades—in all productive work, it is through the hands of artizans the work is done, and there is incalculable gain in the workmen being prepared to understand fully the reason for their operations. Deliberate neglect of necessary precautions must be rare, but ignorance is common and though less blameworthy is as effective for evil; for the law of nature like the law of the land makes no exception in favour of those who are ignorant of its provisions.

TORONTO BUILDING BY-LAWS.

There is urgent necessity for a thorough revision of the local building regulations of Toronto. Architects find it impossible to obtain from the Building Department printed copies of these regulations. When information is required as to what may or may not be done under the by-laws, it becomes necessary to make a personal visit to the City Hall. This condition of things is uncalled for, involving as it does waste of valuable time by the architect which, especially in a busy season like the present, he can ill afford to spare. The existing by-laws have been subjected within the past ten years to many amendments of a patchwork character, and in the absence of printed copies of the law as amended, it is impossible to know what its provisions are. This much is known, however, that the present regulations are by no means up-to-date, and require to be thoroughly overhauled, and made applicable to modern requirements. No provision exists for the proper regulation and inspection of steel constructed buildings, and the only guarantee that the public have that such buildings are properly constructed is the confidence which they repose in the architect who plans and supervises the work. The building inspectors go about their work in a manner to show that they know little or nothing about this method of construction. They pay particular attention to the thickness of the walls, while passing by with a glance steel supports on which the safety of the structure chiefly depends. The lack of knowledge which obtains on the part of aldermen and civic officials with regard to the use of iron in building construction is evidenced by the absurd regulation in the present law that all bressummers in buildings shall be of iron instead, as formerly, of wood. It is scarcely necessary to mention that the heavy wooden bressummers formerly used were much more capable of resisting fire than is unprotected iron. The Ontario Association of Architects took hold of this subject some four or five years ago, and submitted to the Council a well considered draft of a building by-law. The Council have, however, shown no appreciation of their work, and nothing has been done in the direction of adopting the suggestions made. With the present revival in building, action should be taken by the Council to bring the building regulations up to date. There should likewise be placed in charge of the Building Inspection Department an official possessed of sufficient scientific knowledge to be able to estimate the safety of buildings under construction. At present there appears to be no person connected with the department competent to calculate stresses of materials with any degree of accuracy, and inspections are made by the rule of thumb method.

City Hall, Hamilton, Ont.—James Balfour, Architect.

ONTARIO ASSOCIATION OF ARCHITECTS.

The Ontario Association of Architects, established by the Legislature of Ontario as an examining body to further the proper education of architectural students, and by this means to advance the art of architecture, have found that some inducement greater than they can now offer is necessary to make students prepare and present themselves for examination.

The Association have therefore decided to offer a medal to the student attaining to the first place in the final examination, and to make an appeal for the foundation of a Travelling Studentship. Fifty well known citizens of Toronto have been asked to subscribe the sum of $100 each, so that a fund of $5,000 may be raised from which to derive an income for the purpose of this studentship, which would be known as the Toronto Architectural Travelling Studentship.

The charge of the fund is to be with the Council of the Association. The investment of the fund by the Council is to be made to the satisfaction of a two-thirds majority of the subscribers.

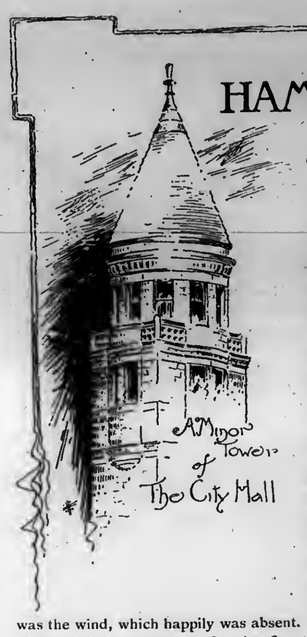
In the event of the medal not being awarded in any year, that year's income from the Studentship Fund will be added to the principal.

It will be provided that this fund, or the income from it, shall not be used for any other purpose than that proposed, and, in the event of anything occurring to prevent the continuance of the studentship, the money will be returned to the donors or their heirs.

We are pleased to chronicle the inception of this important undertaking by the Association, and trust that it may be carried to a successful conclusion, in which event a decided impetus will have been given to the study of architecture in this province.

When the thermometer was 3 degrees below zero measurements of the Brooklyn bridge were taken of the trusses and other parts to find out how much the contraction had been. In comparing these figures with those taken last July, when the thermometer was 30 degrees above, it was found that the difference was fourteen feet and a half.

HAMILTON



(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

The somewhat serious fire that occurred on the night of the 4th May here seems to substantiate my remarks in my last letter as to the risks this city runs from the inflammable nature of many buildings within its limits. The building destroyed that night was a wooden factory of considerable size, standing in the centre of a block, in a populous district, almost surrounded by timber and other frame buildings, and all that was needed to assist the spread of the fire to a very alarming extent was the wind, which happily was absent. It required the efforts of the whole brigade to confine the fire to the factory building itself. It was just at this time last year that the old Spectator building in the heart of the city was burned down while it was undergoing remodelling.

It was reported in some local paper and from thence found its way into the CANADIAN ARCHITECT AND BUILDER, that the architects of Hamilton were making a complaint that the heads of departments in municipal affairs were in the habit of carrying out small works that required the service of a builder, obtaining tenders them and so on, and not consulting members of the profession or permitting them to superintend the works or prepare necessary plans. So far as I can find out there is an error here, and a question asked in reference to the authority of the building inspector to advertise for tenders, by a private individual, was construed with the wonderful ingenuity of a daily paper reporter to be the "registering of a kick" by the architects. I do not think the architects of Hamilton as a rule are quite so hungry that they would take the trouble to find out why the building inspector does not employ one or more of them to superintend the laying of a few thousands of bricks here and there. At any rate they would naturally resent such an insinuation.

There is a good deal of building going on this season, principally, however, of a commercial character, factories, warehouses and such things. Existing buildings are being enlarged and some new ones added. The Hamilton Stockyards Company will have in a few months one of the best equipped stockyards in the country; with a $10,000 hotel of its own. Senator Sanford is making a large addition to his clothing factory, and altogether the building record for the year is far ahead of last year. There is, however, very little architecture, nothing in which the artistic portion of the architect can revel—bricks and mortar, columns and girders of the most utilitarian pattern being the only requisites. The extensive alterations that have been going on for several months at the new Royal Hotel under Mr. W. P. Wetton, as architect, are approaching completion, and it is only fair to say that he deserves great credit for his work. The whole building has been remodelled and a great deal of marble introduced in the main hall with plate glass panels. The details are all very good and carefully worked out. The new Royal is certainly, although smaller than some, the most beautiful hotel in its interior of any in the province. The proprietors have understood the value of having good work done and there is nothing cheap or tawdry in the result.

The plumbers of the city have formed themselves into an association under the presidency of A. Clark, and with George Stevenson as secretary. The membership includes all the master plumbers in the place, and numbers thirteen. The principal object in view is to keep as much as possible to a uniform price for work. Such associations would I think gain far more for themselves, if they existed as sections of the Builders' Exchange. As separate bodies they incur expenses without the advantages of the rooms of the Exchange and the general meetings, and as a rule it is to the advantage of each man to belong to the Exchange, so that two subscriptions are paid instead of one. As a part of the Exchange they can still have their own meetings, with their president and other officers duly elected, and be as separate as they like so far as their own trade is concerned, but there are many objects to be gained by affiliation with the Exchange, and they would do well to connect.

The space between The Gore, (a view of which appears on another page) and the Macdonald Monument, on King street east, is being transformed into a public flower garden. The change is one which will add much to the appearance of our most important thoroughfare.

R. W. GAMBIER BOUSFIELD.

UTILIZING WASTE HEAT.

In discussing the topic "Simple, Inexpensive Schemes for Warming and Ventilating Small Buildings, Dwellings, etc.," at the annual meeting of the American Society of Heating and Ventilating Engineers, Prof. R. C. Carpenter described the attachments made to a hot air furnace which was burning enough coal to heat the building in which it was placed without doing it. The attachments were made with a view of increasing the heating capacity of the furnace and reducing the fuel consumption.

The first attachment was a water heater placed in the fire and combustion chamber for heating water to be circulated through radiators placed in rooms that were not satisfactorily warmed. This addition enabled the furnace to heat the building, but did not reduce the waste of heat in the chimney or reduce the coal consumption sufficiently. The temperature of the gases at the point where they entered the chimney was very high and the draft very rapid. The velocity of a draft increases with the temperature very rapidly up to 250 degrees, but much slower as it reaches the maximum at 550 to 600 degrees.

In order to utilize the heat of the gases so that a smaller amount of the fuel would do the work a section of a recently introduced cast iron wall radiator was incased in a galvanized sheet iron box and connected with the return pipe from the radiators. This box was made to fit close, so that it would bring the hot gases into contact with the radiator. The smoke pipe from the furnace was connected with one end of the box and the hot gases allowed to pass over the surfaces of the radiator section and then dive under a partition at the opposite end before escaping to the chimney pipe.

This method of utilizing the heat that had previously gone to waste was adopted in preference to creating an air heating chamber by jacketing the smoke pipe, owing to water absorbing heat much more freely than air. This attachment had a double effect; it heated the return water without interfering with the circulation, and practically nullified the waste of heat in the chimney as far as was desirable by reducing the temperature of the escaping gases to 150 degrees. It also reduced the work to be done by the water heater in the fire chamber. The introduction of the water heater and radiators reduced the amount of air to be heated by the furnace, and utilized the heat of the gases in heating the water so as to enable less fuel to do the heating. A comparison of the amount of fuel previously consumed and the amount of heating done with the work now done and fuel now consumed shows a saving of about 50 per cent.

CHOIR SCREENS.

These originated from the stone balustrade or railings which separated the presbyterium from the other parts of the ancient basilica. They were afterwards retained to separate the space devoted to the clergy from that portion allotted to the congregation. Choir screens were frequently of the most elaborate design and were adorned with statues and traceried openings or panels. On the Continent, many magnificent examples are to be found. The screen of the minster at Basle, that at Havelburg Cathedral, Munster, Germany, and the Magdelene Church, Troyes, France, are splendid instances of choir screens. In England we may name Long Sutton, Kingsbury, Barnwell, Newark, Stanton Harcourt, and Chester Cathedral, in which churches the screen or rood-loft appears to have been used. The parclose screens at Fyfield (Berks), Ingham (Norfolk), Lavenham, Long Melford, Southwold, and Spalding, are good examples of wooden screens of the Perpendicular period.

GORE PARK, LOOKING EASTERLY FROM JAMES STREET, HAMILTON.

ILLUSTRATIONS.

STREVEL TERRACE, WINNIPEG.—GEORGE BROWNE, ARCHITECT.

HALL IN W. FLUMMERFELT'S HOUSE, VICTORIA, B. C.—S. MACLURE, ARCHITECT.

LEAVES FROM A SKETCH BOOK.—BY STEPHEN A. HEWARD.

The church tower at Wraxall, Wils, is very simple and pleasing, and it has a peculiarity in the construction of its roof—no wood at all being used. Large stone slabs, which weather on each other, are supported by arched stone ribs inside, one rib being under each longitudinal joint, of which there are five.

Wiltshire is a "stone" country, and in a stone country good architecture is usually to be found, because the builders of the period used the material that was at hand and learnt its nature and capabilities.

From this use of local material the external effect is usually happy and good, and to this is attributable the beautiful harmony of nature with buildings so noticeable in English country and villages. The stone walls and roof of a building—for the roof in this country is always of stone, too—weathered and aged exactly as the stones in the fields, being the same, and so became a natural part of the landscape.

MURAL DECORATIONS IN THE NEW MUNICIPAL BUILDINGS, TORONTO.—BY G. A. REID, R.C.A.

On the afternoon of Tuesday, the 16th inst., these mural paintings were formally presented as a free will offering of the artist, to the city of Toronto, by Mr. B. E. Walker, President of the Toronto Guild of Civic Art. In making the presentation Mr. Walker recalled the circumstances attending this generous gift on the part of Mr. Reid, as follows:

"In 1897 when the city hall was nearing completion certain artists, Mr. Reid among the number, who had been studying together the most advanced methods of wall painting, and especially the methods of Paul de Chavannas, offered to decorate several panels in the Council chamber with certain subjects, the designs of which were submitted. The price suggested for the work would clearly not have remunerated the artists in an adequate manner, the offer being made in the interests of the development of art in this country. It the offer had been accepted the work was to have been done under the supervision of the Guild of Civic Art, a body as most of you know, the advisory board of which is composed partly of laymen, partly of artists, architects and designers. In view of the great cost of the city hall the Council did not feel that they could afford to pay for the decorations at that time, although there was a very strong feeling on the part of many of the aldermen in favor of encouraging such a good work.

"The project for decorating some of the panels of the Council chamber having failed for the moment, Mr. Reid generously offered to decorate two panels and the spandrels of the arches constituting the main entrance as a gift to the city, the work to be done under the supervision of the Guild of Civic Art. It seemed desirable that at the very commencement of the use of this noble building there should be in constant evidence some touch-stones of modern wall decoration, so that we may be saved from mere commercial decoration such as we have heretofore had in Canada, and also from wall paintings conceived in a proper enough spirit, but executed without regard to the true principles of decoration. It also seemed desirable that it should be made clear to the simplest mind that mural decoration does not involve, as it seemed to at one time, an entire departure from the ordinary facts of life. It is true that these facts must be dealt with in a manner entirely different from that adopted by the painter in easel pictures. Such realism and dramatic action as may be necessary to tell the story must be subordinated to certain principles of line and color which are vital in decoration.

"The projection on walls or other flat spaces by the painting or sculpturing of scenes commemorating historical events, or by other designs of general interest to man, is one of the oldest means of decoration of which we have knowledge. Such painted or sculptured designs have always attracted the great mass of humanity, and it must be because of our intensely utilitarian habits that thus far in Canada this phase of art has been neglected and some great buildings have been allowed to remain for years with all the ugliness of bare walls and without even a serious protest from the public. We have only to look at this beautiful hall, however, to realize that this is a fitting time and place to begin a new era in Canada for this particular art, and let us hope that the good seed sown by Mr. Reid will so root itself in the minds of the people that other artists will be able to project their ideas upon these and other walls until a great national school of wall painting has been developed.

"To speak more directly, we hope that year by year, not too rapidly, the various spaces in this magnificent building—and there must be hundreds of them—will be filled with histories and allegories bearing upon the development of Canada, and especially of this part of Canada. * * * * You will notice that at the top and bottom of the panels thirteen spaces are arranged. A committee of the Canadian Historical Society were asked to suggest names to fill these spaces and as a matter of record I will now read the names selected: Galinee, Simcoe, Tecumseh, Brock, Osgoode, Laura Secord, Baldwin, Strachan, William Lyon Mackenzie, Allan, Macdonell, Ryerson, Scadding."

With the paintings there was presented the following document:

TORONTO, May 16th, 1899.

This document is to record the presentation to the corporation of the City of Toronto of the series of mural paintings which occupy the panels immediately on either side of the main entrance of the new City Hall, and the spandrels between the arches, by George Agnew Reid, painter, member of the Royal Canadian Academy.

These paintings are a gift to the city from the artist, and in accordance with his wish, their execution has been supervised by the Toronto Guild of Civic Art. The members of the Guild take this opportunity of recognizing with the deepest appreciation the generosity of Mr. Reid in thus giving of his best to the city in which he lives. On his behalf the Toronto Guild of Civic Art hereby hand over to the corporation of this city these paintings which commemorate and illustrate the heroic life and work of the pioneer settlers of this country, in the hope that while they add to the completeness of the building in which they are placed, they may also help in the creation and maintenance of a refined and artistic taste in those who from time to time look at them.

In tendering this gift, the Guild take leave to express the hope that these fine decorations may prove to be but the first of a series of historical memorials of this nature illustrating the progress of our country, which may be placed in this and other buildings. They beg to record their conviction that no better investment can be made than the expenditure of money in the proper decoration of such buildings, which thus not only add to the attractiveness and interest of the city in which they stand, but are calculated to be a valuable means of artistic education and an inspiration of true patriotism.

Signed on behalf of the Guild,

B. E. WALKER, President.
W. A. LANGTON, Secretary.

SUPERVISING COMMITTEE.

B. E. WALKER. JAMES MAVOR. BERNARD MCEVOY.
PROF. CLARK. FRANK DARLING. L. R. O'BRIEN.
E. WYLY GRIER.

ARCHITECT'S CLUB.

The weekly meetings of the social club recently organized by some of the younger architects of Toronto, have proved both interesting and instructive. The practice thus far at the meetings has been for one of the members to submit a number of architectural photographs, and in a brief talk discuss their merits. Following the talk has come a general discussion by the members. On resuming their regular meetings after the vacation, the purpose is to endeavor to arrange for a series of papers on architectural subjects.

CUTTING STEEL GIRDERS BY ELECTRICITY.

The Moulton Starratt Contracting Co., of Chicago, while engaged on the reconstruction of the New York Life Building, in that city, found it necessary to cut through six steel I beams, each 15 inches high with a ½ inch webb and 6 inch flange varying in thickness from ¼ inch at the outside to 1 inch at the center.

COURT HOUSE, HAMILTON, ONT.

The point at which the cut was to be made was located in such a position that it would be necessary to have special saws made, and as three I-beams of this size, side by side, would not cut very easily, it was estimated that in addition to the time required to make the special saws it would take two men at least two weeks at $3.50 a day to saw them off. This loss of time in finishing the job and the expense involved were important considerations, and when it was suggested to Ralph Starrett, superintendent of the contracting company, that inasmuch as a smooth cut was not necessary, it might be feasible to get the girders burned off with the electric arc, he placed the matter in the hands of Clyde J. Coleman of the Coleman Laboratory of Experimental Engineering. Mr. Coleman has done considerable work in the line of electric arc burning for the purposes of getting into safes and vaults with broken locks, and for cutting new doorways in vaults already in place, and also as an interesting experiment to demonstrate the possibilities of safe burglary by this method. Mr. Coleman pronounced the plan of burning off the I-beams perfectly feasible and undertook the task. The time actually required for electrically burning off the six girders was about twelve hours, and from four to five hours more were spent on mechanical work, such as removing girders to get at the remainder. The electric arc therefore, did in two working days what would have required from two to three weeks by the usual method, resulting in a great gain of time for completing the remainder of the job.

The plan of operation, as described by the Western Electrician, is very simple. Current was applied at 110 volts from one of the dynamos in the plant of the building. The current used was about 350 amperes. The positive side of the circuit was grounded on the structure of the building and the negative connected to a carbon holder containing a 1½-inch round carbon. The carbon holder had a wooden handle. The operator struck an arc between the spot on the iron to be melted and the carbon. The light and heat were intense, and the effect was very disastrous to the eyes where proper precautions had not been taken. The arc is usually covered over with a muffle, consisting of an asbestos lined iron box, with a hole in the back just large enough to admit the carbon used. The box is placed against the iron to be burned and the carbon thrust through the hole and the arc drawn. In places where there is not room for the box the carbon is simply thrust through a shield consisting of a sheet of heavy asbestos board. Some resistance has to be placed in the circuit, as is the case with any arc working on a constant potential circuit. The resistance used in this case was simply a few turns of German silver wire placed in a pail of water under a faucet, from which it was constantly replenished.

QUESTIONS AND ANSWERS.

IN answer to the query of a subscriber, "Could you give me a receipt for filling up small cracks in plastered walls before having them kalsomined or painted?" we beg to submit the following: Mix up plaster of Paris to the consistency of soft putty; press the mixture into the cracks with a trowel or with a painter's putty knife; smooth off the wall before the plaster sets, and if not smooth enough, rub down lightly with No. 0 sand-paper. The plaster expands as it dries and remains firm in the crack.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.

HONOR TO A CANADIAN ARTIST.

The news has reached Canada that a place has been granted in the Paris Salon to a painting by Miss Mary Pomeroy, of Crompton, Que., who is at present studying art in the French capital.

THE MONASTERIES AND ABBEYS OF OLD ENGLAND.

Prof. Capper, of the architectural department of McGill University, lectured on the above subject before the members of the Women's Art Association at Ottawa recently. The lecture was illustrated by limelight views and was highly appreciated.

AN ACT TO DETERMINE THE LENGTH OF A WORKING DAY FOR WORKMEN AND LABOURERS.

A bill with the above title has been introduced into the Dominion parliament by Major Beattie. It provides: "1. That eight hours shall be the length of the working day for all workmen and labourers employed, either permanently or temporarily, by any person or by any contractor or sub-contractor under him. 2. That every such person, contractor or sub-contractor who has under him or who employs workmen or labourers, and who wilfully violates the provisions of this Act, is guilty of an indictable offence, and liable to a penalty not exceeding $1,000, or to imprisonment for a term not exceeding six months, or to both penalty and imprisonment, in the discretion of the court."

REQUIREMENTS OF NATIVE ART.

In behalf of the Royal Canadian Academy of Arts the government has been memoralized to make provision for an adequate representation of Canadian art at the Paris Exposition and to grant such assistance as will enable the Royal Society to make an annual exhibit of native art in the leading cities of Canada. The government are also requested to amend the existing law in a manner to suppress art lotteries in the province of Quebec. The petition on this subject sets forth that the act under which art unions are conducted has been seriously perverted, and that the plan which was originally intended as a means of encouragIng art, has become a mere cloak for gambling and financial gain, and that as at present conducted such lotteries are a detriment to the cause of art.

INTELLECTUAL FREE TRADE.

The majority of your readers, like myself, will probably sympathize with the views expressed by Principal Peterson of McGill University at a recent graduates' dinner in Ottawa, when he pleaded for intellectual free trade between the provinces of Canada. "At present," he said, "each province surrounds many professions with such limitations that a man trained in one province cannot practice in another, except after going to much trouble and inconvenience in passing examinations or in putting in a probationary term." Whatever barriers we may consider advisable to raise against other countries—and we can scarcely be charged with having been too strict in this respect—there should certainly be the greatest possible uniformity of practice and liberty accorded to members of the professions residing in any part of Canada.

PERSONAL.

J. Rawson Gardiner, architect, has removed his office to the Temple building. He worked conjointly with the late Alex. G. Fowler (who was one of the oldest and most respected architects in Montreal) for the past five years, and will now carry on the practice in his own name.

CORRECTION.

OTTAWA, April 26th, 1899.

To the Editor of the CANADIAN ARCHITECT AND BUILDER:

SIR,—In your March issue of the CANADIAN ARCHITECT AND BUILDER is an illustration of the interior fit-up of the library of parliament at Ottawa. You credit the authorship of design therefor to Messrs. Fuller & Jones, Stent & Laver and Thos. Fuller.

I am quite satisfied that were these gentlemen now living they would be the last to covet credit for another person's work, and as no one else has thought it necessary to correct your mistake, I will do so.

The architects named by you designed the structural part of the library, exclusive of all interior fit-up of the book shelving, etc., and which latter work forms the subject of your illustration.

During the tenure of office of the former chief architect—Mr. Thos. S. Scott—I was acting as assistant to the chief architect, and at his request I designed and superintended the construction of the interior fit-up of the library, and on leaving the service I received from Mr. Scott a letter dated 11th June, 1877, accrediting the authorship to me. I may add that the clerks' desks immediately surrounding the Queen's statue were designed by Mr. J. W. H. Watts, then in the service.

So, while Mr. Scott officially was responsible for the work, actually he had nothing to do with it boyond authorizing and approving of what was done. So whatever the public estimate of merit, or the reverse, which attaches to the interior fit-up of the library of parliament at Ottawa, it belongs to me, and I shall esteem it a favor if you make this correction in your next issue.

Yours truly,

FRED. J. ALEXANDER.

LEGAL.

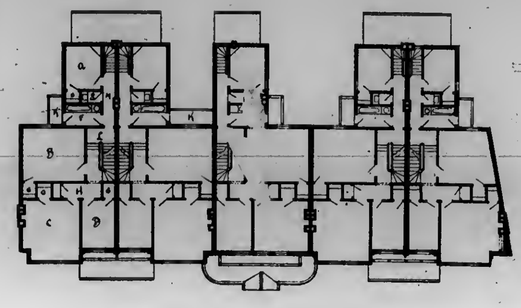
A compromise has been reached in the action brought against the city of Toronto and A. M. Brown, contractor, by Pilkington Bros., glass manufacturers, of St. Helens, England. Mr. Brown, who received the contract for painting and glazing the new municipal buildings, gave an order to the Pilkingtons for 15,000 feet of glass, which the specifications provided should be of the very best quality of extra fine British polished plate glass, one quarter of an inch thick. After a large quantity of the glass had been delivered the architect rejected it on the ground that it did not fulfil the terms of the specifications as to quality. Then followed a suit by the manufacturers for $4,721. After a prolonged legal fight a compromise was reached under which it said the claimants will receive $1,400, or 20 cents per foot for the glass in dispute, the glass to be retained by the contractor.

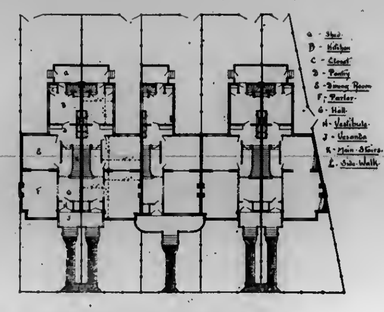
SHERWOOD V. BALCH.—This action was brought by sub-contractors against the contractors for the construction of the New York and Ottawa railway line. The plaintiffs' contract was for excavation, and contained a provision that the work should be done "in conformity to the plans and directions, and to the satisfaction and acceptance of the chief engineer." It was also provided that in case of disputes and differences the matter should be referred to the engineer, "who shall consider and decide the same, and his decision shall be final between the parties." The plaintiffs were paid the amount of a final estimate of the engineer, but contended that by custom they were entitled for work measured in embankment, instead of excavation, to a price 10 per cent. in advance of the price paid by the engineer. It was held in the High Court of Justice for Ontario that although the engineer had publicly and privately expressed himself to the effect that no such usage existed; yet as he swore he would, nevertheless, give the plaintiffs' contention fair consideration should the matter come before him as arbitrator, action must be stayed until arbitration. By the 19th section of the Arbitration Act, 1889, a method is given contractors, if they feel aggrieved, to obtain the opinion of the court upon the true construction of the contract.

In the American Monthly Review of Reviews, which publishes a frontispiece portrait of Rear-Admiral Kautz, the Samoan difficulty is reviewed by the editor in the department of "The Progress of the World."

Dr. Thomas Oliver, of England, who has been investigating the cause of the "compressed air disease" which so frequently affects workers in caissons, has come to the conclusion that it is due to the increased solution in the blood of the gases met with in compressed air, and the liberation of these gases after the person escapes from the compressed atmosphere.

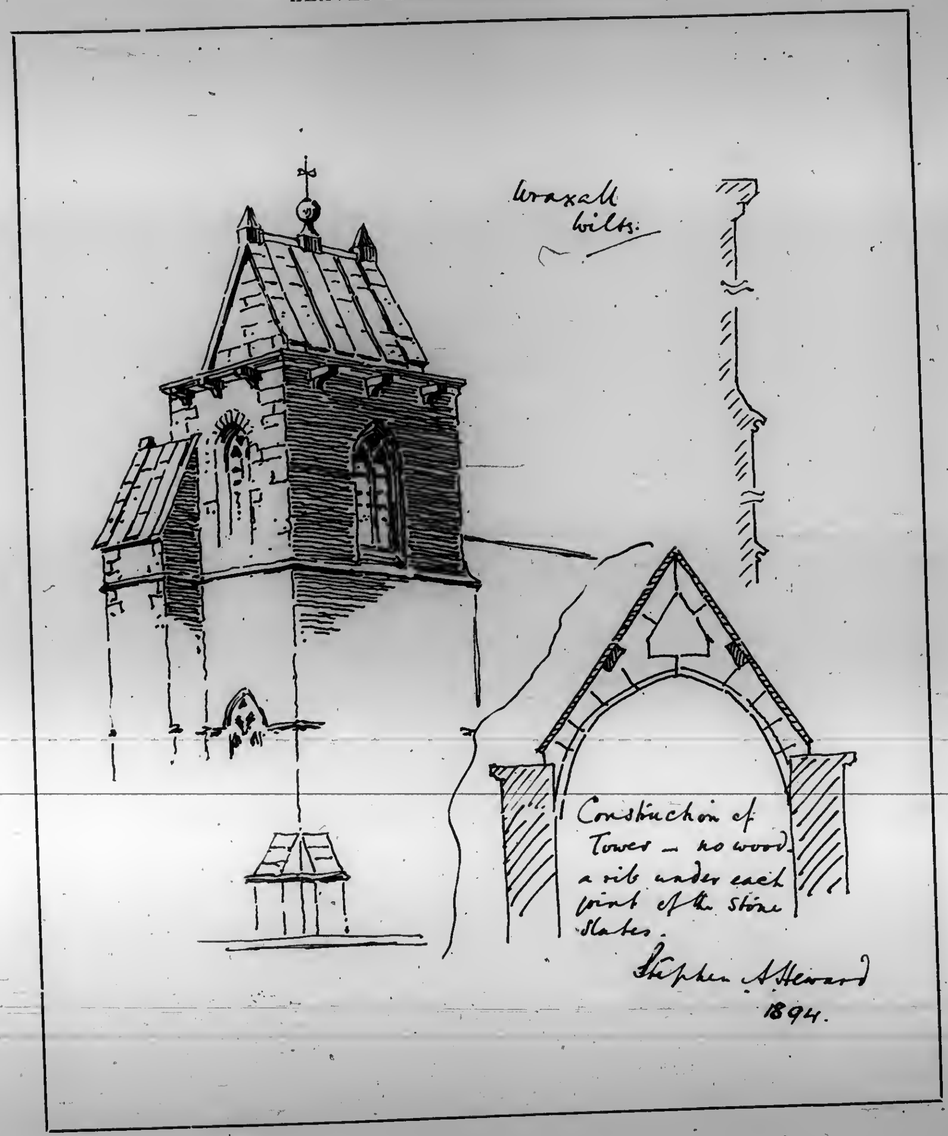
HALL IN W. FLUMMERFELT'S HOUSE, VICTORIA, B.C.
S. MACLURE, ARCHITECT.





STREVEL TERRACE, WINNIPEG, MAN.
GEORGE BROWNE, ARCHITECT.

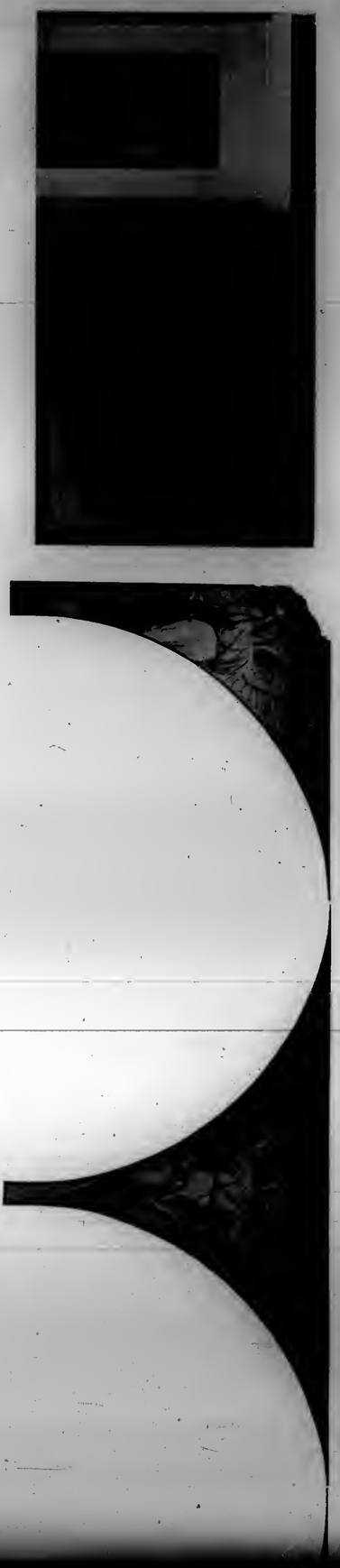
LEAVES FROM A SKETCH BOOK.



says : " By going deeper into the study of a design we get down still there.

UNICIPAL BUILDINGS, TORONTO.

Y BY G. A. REID, R.C.A.



MURAL DECORATIONS IN THE NEW M

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THE TEACHING OF ART AND DESIGN.

THE importance of the relation which should subsist between the teaching of art and design and the industrial development of a nation, has long been recognized in European countries, and of late in the United States. It is gratifying to observe that in Canada also the subject is attracting attention. The Executive Committee of the Canadian Manufacturers' Association, held on April 28th, adopted the following comprehensive resolution :

Whereas;—fully appreciating the merits of all that may be said relative to the necessity of technical schools being established by those in authority to whom attaches the responsibility for the life and growth of our commercial enterprises, it is expedient to direct attention to the teaching of art and design which is an important part of the education which should be imparted to the young people of the country who propose to give their after years to labor in industrial pursuits.

Technique is all important in building a boiler, loom or other machine which gives the power or means to produce a finished article. This branch is important, but it is only a very small part of the result to be attained.

The product, whether it be of metal, wool, cotton or wood, is only of value in the commerce of the country according to its utility and appearance.

Designing in all branches is so wrapped up in the values of a manufactured article that all countries are vieing with each other to excel therein.

In designs the taste of the British manufacturer at the great exhibition of 1851 was so crude as to shock the taste of the world, the result being that the Prince Consort, at the request of Jones, Redgrave, Playfair and others, established the Kensington School of Art and Design. This example was quickly followed by the establishment of many similar schools throughout the country, a notable result being that in 1867 Great Britain was awarded the palm in decorative art.

POST OFFICE, HAMILTON, ONT.

It was the art schools of France that made that nation the leader of the world for many years in the production of the finest chef d'oeuvres ; but with the British, German and American nations all working for the highest excellence of design and color in their manufactures, the commerce of France soon found competitors of equal strength.

In Canada no strong effort has yet been made to develop, in our schools, the art needed in our manufactures. While our industrial establishments are giving every sign of extensive development and expansion, every facility should be afforded by our government to supply competent designers to them ; and in no way can this be so well done as by equipping and supporting industrial art schools, where art and technique work hand in hand.

It requires years to develop acknowledged lines of design in art and many countries and periods have become known in the commercial world by the peculiarities of their designs. This may be instanced in the following in design class, as Persian, Turkish, Grecian, Byzantine, Renaissance, Empire, etc.

It is by going into the value of a design that appreciation of an article is forced upon us. Mr. Leslie Jones in an able paper says : "By going deeper into the study of a design we get down to examining and analyzing the forces and undercurrents of power that lie in a great piece of work. We appreciate that there is something more than mere existence of form and color, even if it is arranged according to the laws of ornament which defy all errors. Take for instance two designs precisely the same in character executed by two different persons. Both works might be termed excellent, both true to the character of form and the laws of ornament. Yet one may have something the other has not. There seems to be a touch of life in one that speaks a gentle and thrilling message which the other does not do. Surely, then, there must be more of the soul of the designer that finds its way to affect us in this mysterious manner than of the other which affects us not. All the knowledge we have from the ancients to the present day amounts to little when compared with this creative genius which flows from the inner soul."

This emphasizes the fact that it would be in the interest of the whole country that the government should establish and equip industrial art schools in all the leading manufacturing centres of the Dominion to the end that our manufacturers might be supplied with designers possessed of artistic abilities.

Whereas;—there are no existing schools constructed or equipped to meet the necessities herein alluded to ;

Resolved, that this Association use its efforts to induce the proper authorities to establish, or contribute to the support of schools of art and design in the manufacturing centres of the country that will promote the growth and development of our industrial institutions.

FIRES IN ROOFS.

ASTONISHMENT is frequently expressed at the rapid spreading of fires which occur in the roof spars. The flames distinctly break out in the one gable, then appear at the other, and suddenly the whole roof is on fire. We are inclined in such cases to believe in several sources of the fire, and to harbor a suspicion of incendiarism. According to Sendtner, a fire brigade officer of Munich, that suspicion may be quite unjustified. He saw that one of the rafters at the end of a hall had caught fire. The hall became filled with smoke, but he distinctly observed that little blue flames began to creep along the beams ; they reached the other gable, found more convenient ground there, and all at once the whole roof was ablaze. The observation suggested to him that the fire spreads with the aid of a kind of dry distillation in the wood. Experiments confirm this view. We read in the "Gesundheits-Ingenieur" that he rigged up roof models of spars and sheet iron without any intermediate wooden parts, and set fire to the lower end of a spar in the one gable. The hot gases travelled along the ridge, the other gable caught fire, and soon all the spars burned as if each had been set fire to.

The duration of slate roofs is variously placed, but is usually given as sixty years. A resident of Bangor, Me., informs a contemporary, however, that in 1863, when he was living in England, he assisted in removing the slate from the roof of a building of the Plymouth dockyards that was known to have stood over 300 years. After the old building had been torn down a new structure was erected on the same site, and the slates, after being redressed, were placed on the new roof, and at last accounts were still there.

STUDENTS' DEPARTMENT.

STUDENTS' AND DRAUGHTSMEN'S COMPETITION.

THE publishers of the CANADIAN ARCHITECT AND BUILDER invite architectural students and draughtsmen in Canada to enter a competition for architectural photographs. The subject is a constructed residence costing $10,000 or under. Photographs must show a perspective view of the entire building. They must not be less than 4 × 5 inches in size, and must be accompanied by a brief memorandum descriptive of the location, site and aspect of the building and the material and coloring, together with the name of the architect, if obtainable. The photographs will be judged from an architectural standpoint as exhibiting specimens of good design—the object being to test the student's or draughtsman's knowledge of design. Photographs must be suitable for reproduction. Competitors are not restricted as to the number of photographs which they may submit.

Photographs for this competition should be sent under nom de plume, all charges prepaid, marked "Competition," addressed to the "Publishers of the CANADIAN ARCHITECT AND BUILDER, Confederation Life Building, Toronto," and must reach this office not later than 5 p.m. on Thursday, May 25th next. They must be accompanied by a separate sealed envelope containing the nom de plume and full name and address of the competitor.

The merits of the photographs submitted in this competition will be judged by a committee of the Ontario Association of Architects and the Province of Quebec Association of Architects, whose decision will be final.

The publishers of the CANADIAN ARCHITECT AND BUILDER reserve the right to publish any of the photographs submitted, and to withhold the prizes if in the opinion of the judges, a reasonable response is not made on the part of the students and draughtsmen to this invitation.

The first prize will consist of architectural books to the value of Ten Dollars and the second prize of architectural books to the value of Five Dollars. The persons to whom the prizes may be awarded will have the right to select such books as they may desire within the above mentioned limits of cost.

CONVENTION OF ARCHITECTURAL CLUBS.

The secretary of the Chicago Architectural Club, with the sanction and support of the T. Square Club, of Philadelphia, and the St. Louis Architectural Club, and the informal approval of the Boston and Cleveland Clubs, has called a convention of delegates representing the architectural clubs of the United States (no mention is made of Canada), to be held at Cleveland, Ohio, June 2nd and 3rd next. The Cleveland Architectural Club have tendered the use of their rooms, for the convention. The subjects proposed for discussion are: "Club Work," "Methods for acquiring and holding the interest of members," "Management of Exhibitions," "Establishing an Exhibition Schedule and Circuit for 1900," "Establishing a National Exhibition Committee whose Duty shall be to Solicit Foreign Exhibits in the Interest of all Clubs of the congress;" Discussion of the "Code Governing Competitions" as adopted by the T. Square Club, The Architectural League of New York, The Chicago Architectural Club and other similar organizations. Papers on questions pertinent to the profession, and such discussions and new business as may develop later. Any further information regarding this convention can be obtained from Mr. N. Max Dunning, secretary Chicago Architectural Club, Art Institute, Chicago.

TORONTO TECHNICAL SCHOOL EXAMINATIONS.

Following are the names of the pupils who were successful in architectural subjects:

MODELLING IN CLAY.—Modelling from the "flat" in Relief. Elementary—Miss L. M. Phillips, Miss M. Baigent, Mrs. Whett, R. Quigley, A. Willoby, Chas. Baker. Advanced—Walter S. Boyce. Modelling from the "flat" in the round. Elementary—Miss L. M. Phillips, R. Quigley, David Ross (Romanesque), H. G. Muntz (Norman capital). Advanced—Walter S. Boyce.

BUILDING CONSTRUCTION, ADVANCED.—Class II—E. M. Meshaw.

ARCHITECTURAL DRAWING, PRACTICAL.—Elementary—Class I—Frank Belfry, George Barber. Pass—David Hood, Alex. McClements.

ARCHITECTURAL WORK, PRACTICAL.—Advanced—Class II—E. M. Meshaw.

SHEET METAL PATTERN WORK.—Class II—H. Park. Pass—W. J. Cook.

BUILDING CONSTRUCTION.—Carpenter and joiner work—Class I—Frank E. Balfrey, George Barber. Class II—D. A. Key, R. Bruce.—Brick work—Class I—George Barber, Frank E. Balfrey. Class II—T. Sullivan. Pass—D. A. Kay.

ARCHITECTURAL DRAWING.—Class I—Frank E. Balfrey, George Barber, R. Bruce. Class II—D. A. Kay. Pass—T. Sullivan.

ARCHITECTURAL THEORIES AND PRACTICE.

Mr Reginald T. Blomfield, M.A., F.R.I.BA., concludes a paper before the London Architectural Association, on "Certain Reflections on the English Renaissance," by saying: "Now, how do we stand at this moment in regard to the theory of architecture? I do not mean abstract theory as to its philosophical basis, but our own attitude to the art. What are the sources to which we look for inspiration? What are the ideals at which we aim in actual design? I fear that the answer to this question can hardly be satisfactory. We are, here at the end of the 19th century, in a condition of greater uncertainty, and more complete absence of conviction than, I should say, at any previous period of history. You have merely to look back upon the last 100 years. We began the century with the remains of the Classical tradition, but Adam had already "improved" it, as he thought; Stuart and Revitt had done their work and the Greek fashion was well in the ascendant. Then came Pugin, ardent, fanatical, full of energy and narrow ideas, a very iconoclast in regard to the old tradition; and after him Ruskin, who thought he had found the key to architecture in his personal preferences and the morality of Exeter Hall. Then came the rush for Gothic, Early English, early French, early Italian, with a vehemence that threatened to sweep the board clear of everything but a heterogeneous collection of details from every country. Every man has been for himself and meantime architecture has gone to the wall. The serious study of architecture, not only as an art, but also as an expression of the intelligence which is not arbitrary, but determined by certain inevitable causes, has almost dropped out of sight, and I suppose that, in practice, the very worst work that has ever been done in England has been done in the last fifty years. I need hardly add that a few men of powerful and original mind have done admirable work, but the average of architecture has been left untouched, and it is by the average level that the state of architecture has to be gauged. We cannot look back with pride on the artistic attainments of the 19th century, judged from any standpoint, and it appears likely that we shall enter on the 20th century without having hit upon any certain way through this quagmire of modern architecture. It is here that the study of the past must help us. The days of the craftsman working independently, yet in unconscious unison, ceased when the choice of styles arose. He tasted of the tree of knowledge, and henceforth to his knowledge of his craft had to be added the responsibility of conscious judgment, if he was to undertake, I will not say architecture, as it might be thought to beg the question, but building of any sort. Because, in any building now-a-days, a man has to use one method of expression in preference to another, and implicitly in this there is raised the whole question of selection. Now, this responsibility proved too much for the simple craftsman, as you may see from the blunders in design which abound in more ambitious Jacobean works; and it was only a question of time how soon there should arise the man who had sufficient training and intellectual capacity to enable him to discriminate between good and bad, to enable him to grasp the logical coherence in expression which is an essential element of architecture. As soon as such a man arose, the matter was settled for good or bad. The architect ceased to be a craftsman in the technical sense, and what might be lost in craftmanship was assuredly gained in architecture. I think, therefore, that this critical function of an architect, this detachment from the actual details of craftsmanship, which chafes the enthusiasm of some of by no means the least gifted of our younger men, is of the very essence of his work. The more of craftsmanship he has the better; but a man may be a very good architect without being a very good craftsman—I mean a good craftsman in the sense of being able to carve his own woodwork and model his own ceilings. His craftsmanship must be of a wider range. It must embrace full knowledge of the past; it must rest on a constant habit of analysis of the best methods of expression in building, and a keenly critical insight into the abstract qualities of architecture, mass, balance, rhythm, and proportion. An architect, to my mind, should be like a fastidious man of letters, he should not be content to express his purpose anyhow, he should be anxious to find the exact inevitable phrase. It is in this sense, I think, that an architect should be an artist of the highest order, and this is the position that has, in fact, been forced upon him since the days of the Renaissance. Perhaps this reflection may be some consolation to those who would reluctantly abandon the idea that in craftsmanship lies the future of architecture. Nor, again, is this ideal less exacting than the other. To attain to this faculty of reasonable judgment it is clear that a man must possess knowledge of what has actually been done in architecture—the more the better, provided he is not over-burdened by it; and this knowledge is not mere student's learning, but means a practical knowledge of buildings, gained by careful analysis and measurements, and by exact observations of materials and local circumstance. A lifetime of constant study is not too much for such a task. I would suggest to you, therefore, to those of you, that is, who are now beginning your career, that there is no short cut to architecture through pattern books, or even through the pleasant paths of detail craftsmanship; but that, nowadays at any rate, you must have knowledge, and that now, as always in the history of architecture, you must seek that knowledge not only in books, but also in the builder's yard and on the scaffolding of buildings. I have still one more point to bring before you. Perhaps in this paper I may seem to you to have insisted too much on knowledge, too little on imagination, and the criticism has been made on some remarks of mine elsewhere. In the first place, I would point out that we seem to be face to face with some dangerous developments of originality, or, rather, eccentricity. To judge by the majority of our buildings, it appears to be thought that "knowledge hampers imagination," as it was put by the eminent Capability Brown. Certainly, the results are a very nightmare of architecture. Now, there is only one antidote to this sort of originality, and it is knowledge. I fancy that some of the more accomplished of our original designers would be rather surprised to find that the flattest of the ogees, the boldest of their amazing proportions, have been anticipated, not only in Italy, but even in England. Even a cursory knowledge of the work of such a man as Baldassare Peruzzi would show them that profound knowledge is not incompatible with the most complete freedom in design; and further, that the most daring imagination can co-exist with the most trivial detail. You may recollect the indignation of the old Sieur de Chambray at the pretensions of the men of his time, who thought that by turning a capital upside down, or something of the sort, they had invented a new architecture, "as it the Pantheon" (I quote the Sieur de Chambray) that same stupendous and incomparable structure, were not the invention of the architect who built it, because he has vary'd nothing from the Corinthian ordnance of which it is entirely composed." In the second place, and this is the gist of all that I have said, this knowledge is not an end, but a means. For an architect does not study in order to reproduce what other men have said once and for all, but to perfect his own mastery of expression; and just as a poet does not invent a jargon of his own or write in the language of Chaucer, but takes the current language of his time, and compels it to his purpose, so an architect would not waste his time in a vain ambition of a new style, or a futile copy of an old one; but would master the best in all the architecture of his country, and find thereby an ample language for his own individuality. It is not styles, therefore, that we are concerned with, but style that indefinite quality of all good architecture, whether Greek or Roman, Gothic or Renaissance; indefinable, and ever varying, because it varies with the individuality of the artist, because it depends on the faculty that the man possesses of giving the simplest and yet the most complete expression of all his purpose. It is here that knowledge must come in, as the groundwork of good architecture. We want to know, as a part of our training in our art, how other men in the past have solved the difficulties that confront us now; and it is only by this long laborious study that we can learn to discriminate between good and bad, and to free our own method of expression from what is trivial and irrevelant. It is this way, and not along the pleasant paths of the amateur, there lies the best chance of the architecture of the future.

THE BUILDER

[THIS DEPARTMENT IS DESIGNED TO FURNISH INFORMATION SUITED TO THE REQUIREMENTS OF THE BUILDING TRADES. READERS ARE INVITED TO ASSIST IN MAKING IT AS HELPFUL AS POSSIBLE BY CONTRIBUTING OF THEIR EXPERIENCE, AND BY ASKING FOR PARTICULAR INFORMATION WHICH THEY MAY AT ANY TIME REQUIRE.]

Bakers' Ovens.

In the building of bakers' ovens, a number of things must be taken into consideration. First, the size of the oven must be determined, then, whether coals or wood is to be used as fuel, and the situation must be decided upon. These things having been considered, it would be well to make a thorough examination of an oven that has given satisfaction, and with these matters settled, the work may be commenced. Let us suppose the oven is to be heated with coals, and the size of the base determined, this base should be carried up to the height of the furnace door, and the ashpit left according to the width of the door and the length of the furnace bars, allowing for the door being set 4½ inches from the brickwork. The frame and the door, should be about one foot square like the furnace door of a steam boiler, set in brick, and the bars should be about twenty inches long, and level with the bottom of the oven and of the door. The flues should be made sixteen inches square for the fire to shoot into the oven from the shoulder, where the furnace is straight across to the opposite angle of the oven, and the fire catching the crown in its course it will spread all round. A register should be fixed in the flue, and a "copper" five or six inches above the furnace, not so as to get too hot, for it is usually warm water only that is used in a bake shop. A register should be fixed within a little of where the flue enters the oven, and rise slanting;

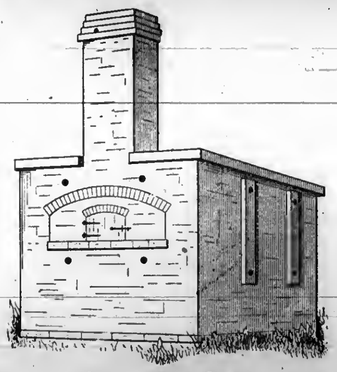

FIG. 1.—BAKE OVEN.

which being stopped when the oven is hot enough, leads to the chimney flue. The general rise of the crown above the flue is from 17 to 20 inches, the form of which is often made of sand which is removed after the brickwork has set. Sometimes an oven is constructed without a copper, and this is, perhaps the better plan, for it is certain the brick and copper will not expand uniformly under heat; though by the use of the copper, more economic results may be obtained as less fuel will be required to heat the oven. The side walls from which the crown of the oven springs, ought not to be less than 2½ bricks in thickness, and the crown spring, should be about nine inches above the

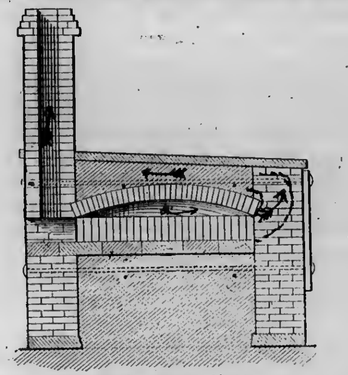

FIG. 2.—SECTIONAL VIEW.

floor of the oven. The angles should all intersect and all be laid with as close joints as possible. In first-class ovens the lining is all of fire-clay bricks, laid in fire-clay mortar. If the top is domed, instead of arched, as is sometimes the case, sand should be spread over the top so that when the work gets dry the sand will fill up any cracks that may result from shrinkage when drying. Fig. 1 shows a perspective view of a very good class of ovens. This is about five feet wide in front and six feet back. It may be made larger or smaller to suit conditions, but this proportion should always be maintained. Fig. 2 shows the longitudinal section and Fig. 3 the

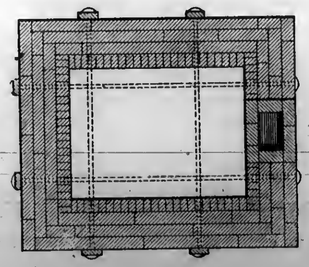

FIG. 3.—PLAN OF OVEN.

plan of the brickwork, showing the iron rods that pass through the oven to hold it firmly together. The manner of laying and binding the bricks is shown in the plan, and the construction is so plainly presented in the illustration that further explanations are unnecessary.

Bricks.

The sizes of bricks vary so much that it is impossible to construct any rules concerning them, that may be said to be correct for every locality in the Dominion, but this should not prevent a contractor from knowing exactly how many bricks it will require to perform a certain piece of brickwork situated in his own locality, if the bricks are manufactured in his neighborhood. The average size of a brick is 8¼ x 4 x 2¼ inches, and 23 of them will make a cubic foot of brickwork, and ten years ago, The National Traders' and Builders' Association of the United States, adopted this size as a standard for common bricks, and 8⅜ x 4⅛ x 2¼ inches for face bricks; but this standard has not yet been obtained. Seeing that bricks, before being burned may be all of one size and that after burning scarcely two bricks may be found in the pile of equal size, it would appear that a uniform size of bricks, is among the impossibilities, under the present method of manufacture. But suppose bricks were made all to one standard as regards size, it would not then be possible to make a mathematically correct estimate of amount of wall a given number of bricks would make in every case, as bricklayers in building walls, do not all make the same thickness of mortar joints; indeed joints vary in thickness from one quarter to three-quarters of an inch, depending somewhat on the character of the work, and this part would destroy the accuracy of any rule defining the dimensions a given number of bricks would make. There is one way, however, a builder may to some extent, overcome the difficulties of the situation, and that is to take a "ten-foot pole"; and on one side lay-off bricks and mortar joints as they average in his neighborhood, taking stretchers on one side, headers on another side of the pole, and face-bricks in the wall on the third side, reserving the fourth side of the pole for a division of feet and inches. From this pole he may be enabled to determine the height and width of frames, thickness of sills, and number of bricks displaced by frames, as well as the number of bricks required to build a wall 10 x 10 feet surface, or any fraction thereof. The uses of a rod of this kind, in an office, may be amplified almost indefinitely.

Hot Air Heating.

To determine the proper size of furnaces to use to efficiently heat a house with hot air, the locality in which the house is built or being built must be considered. It is colder in the region of Hudson Bay, than south of Lake Ontario, and a furnace that would be ample for the latter would be unfit for the former. When a person does not possess the experience with a particular furnace to determine this very important point, the best way is to send a description and plan of the building to some well known manufacturer or dealer in that particular make of furnace, who, from greater experience will be able at once to determine the proper size, and thus save the expense of purchasing the next size larger. With regard to sizes of registers and pipes for different sized rooms, the following rules, which have been prepared for the purpose by an expert may be followed: "In public halls or buildings where but a single register is required, take the hot air pipes from the top of the furnace and use register without valves. The sizes of pipes and registers requisite for the successful operation of any furnace is a matter requiring the best judgment, and should be determined by the size, position, and distance from the furnace, of the spaces to be heated, and cannot be governed by any fixed rule. The figures given herewith, however, have generally proved to be near the correct thing, and are prepared for a building supposed to have ceilings 12 and 10 feet high, respectively: Rooms on first floor, measuring 12 x 14, on plan, should have 8 inch pipe with 8 x 12 inch register; rooms on first floor, 12 x 18 feet, 9 inch pipes, 9 x 12 inch registers; rooms on first floor, 16 x 20 feet, 10 inch pipe and 10 x 14 inch register; rooms on second floor, 8 x 12 feet, should have 7 inch pipe, with 8 x 10 inch register; room on second floor, 10 x 16 feet, 8 inch pipe, 9 x 12 inch register; room on second floor, 16 x 12 feet, 9 inch pipe, 10 x 14 inch register; medium sized halls should have 10 inch pipe with 10 x 14 inch register; large sized halls should have 12 inch pipe with 12 x 15 inch register. All pipes in the foregoing are circular in section. When oval or flat pipes are built in the walls of an ordinary two or three storey house, the basement and parlor floor should have independent pipes; the second and third storeys can be warmed by a single line of pipes reduced in size over each register as follows: A house 18 or 20 x 45 or 50 feet plan, should have a separate pipe, 4 x 16 inches to basement; a house 18 or 20 x 45 or 50 feet, should have a separate pipe 4 x 16 inches to each parlor; a house 18 or 20 x 45 or 50 feet, should have one line of pipe 4 x 18 inches to second storey, reduced to 4 x 14 inches for third storey; a house 20 x 40 or 50 should have a line 4 x 17 inches to second storey, reduced to 4 x 10 inches for third storey. The above sizes to be varied according to the size of the house and the general division of the interior space. When pipes open in the wall directly, they should be sized as follows: A 4 x 24 inch pipe in the wall, should have a 12 inch pipe connected with the furnace; a 4 x 20 inch pipe in the wall should have a 10 inch pipe connected with the furnace; a 4 x 18 inch pipe in the wall should have a 10 inch pipe connected with the furnace; a 4 x 16 inch pipe in the wall should have a 9 inch pipe connected with the furnace; a 4 x 14 inch pipe in the wall should have an 8 inch pipe connected with the furnace; a 4 x 12 inch pipe in the wall should have an 8 inch pipe connected with the furnace; a 4 x 9 inch pipe in the

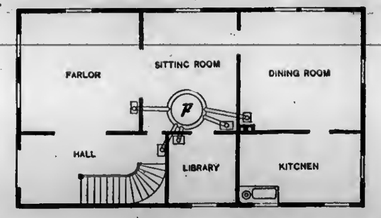

FIG. 4.—SHOWING POSITION OF HOT-AIR FURNACE.

wall should have a 7 inch pipe connected with the furnace; a 4 x 7 inch pipe in the wall should have a 6 inch pipe connected with the furnace." A furnace should be located in the most central position for all the rooms to be heated; for the quicker the heat flows into the rooms, the less friction and condensation occurs, and the better the results obtained. The higher temperature of the air reaching the rooms through the furnace pipes is the only thing that causes circulation. The plan shown at Fig. 4 gives a fair idea of the best position for the furnace to stand. The registers in this case open in the floor, and all are pretty close to the furnace. This subject may be reverted to again.

WHAT PURPOSE SHOULD A NATIONAL ASSOCIATION OF PLUMBERS SERVE?

ED. BRADEN, JR.

In response to a request received from the Chairman of the Essay Committee, I have selected the above-mentioned subject.

There can be no more important question before the national body than the purpose it should serve in its relation to its membership. With this question successfully answered, the duty of each individual member is plain.

When men decide to co-operate—when they agree to harmonize social or commercial interests, the very first thought is, what valid excuse have we to offer for such an association? Is the object or purpose praiseworthy? Is it necessary to better social relations or business interests, as the case may be? Is there a principle of right which we can use as a basis of organization, and which the great public at large must respect? These are the thoughts which must come to men who found organizations based upon principles of mutual interest, or social harmony.

I believe that the true purpose of an association of master plumbers should be as follows:

First, to advance the cause of scientific sanitation. Why? Because plumbing and house drainage are its most important departments.

Second, its special object should therefore be a sanitary law which would provide for the examination and registration of plumbing labour and honest inspection. To secure such law, public prejudice against, or ignorance of its necessity, must be overcome, and to do this there must be a plan formulated for the education of association members who need it, and the education of the people. To educate members the maintenance of pleasant association rooms in each city is the essential point. These rooms should be provided with maps, charts, and blackboards. The library should consist of the latest scientific works on sewer building, house drainage, ventilation, bacteriology, etc., and there should be kept on file at all times trade literature for ready reference. To educate the people to realize the necessity of a plumbing law, educational literature should be issued by the association and distributed by members to their customers and friends.

Third, an object of the Plumbers' Association should be to place the supply trade and the retail trade on a basis of mutual interest. Their interests are identical, and there should be hearty co-operation, and to my mind, there seems no good reason why this cannot be accomplished, if right methods prevail. To this end we must enlarge our memberships and improve the commercial credit of our members through open, honorable, and co-operative business methods.

When we build an association attractive enough to secure 95 per cent. of the purchasing power and reduce the risk of selling materials in our own ranks, we will command absolute trade protection without question, and what is more to be desired, with respect.

To overcome public suspicion and prejudice, we must by these methods improve the character of plumbing work. There is no surer way to win the respect and confidence of the American people than to reduce the death rate of cities and the expense of sickness, which are the result of flagrant, I might say, criminal, sanitary neglect.

An association of plumbers built upon, to my mind, the above lines would become speedily a powerful factor in the world's best progress. Following out such a purpose, our annual gathering would become the theater for scientific discussions and debates of great public import and interest.

Here, for instance, we are met in a city which seems to be upon the threshold of great sanitary reform. I am advised that the press and the people have been looking forward for months to this visit of the nation's plumbers, believing that the deliberations of this convention would bring to them valuable information, aid, and encouragement.

What a disappointment it would be should we, an association organized to serve the purposes enumerated, fail them. Ah, gentlemen, we make a sad mistake when we, as an association of master plumbers, refuse to interest ourselves in the great sanitary problems of the day.

The Southern League of Master Plumbers, an organized district of the National, has tried in a number of ways to show the advantages of an organization on the basis I have outlined. The results which have followed our efforts should convince every member of the association that such a plan meets with the approbation of the public, and as an earnest advocate for the betterment of the plumber, and the elevation of the business, I urge the National Association of Master Plumbers to adopt that plan.

A paper read at the Annual Convention of the National Association of Master Plumbers of the United States, New Orleans, March 8, 1898.

BUILDING MATTERS IN BRITISH COLUMBIA.

A correspondent of the ARCHITECT AND BUILDER writing from Vancouver, says:

"I am much pleased with your Spring Number, particularly with the article, "Builders' Exchange—Why?" Since its arrival the builders of our city met and organized, hoping to be able to do something towards upholding prices, and preventing the keen competition which has, up to the present time, whether the trade was dull or brisk, rendered our business precarious to say the least. I notice, however, by your editorial notes that in your city, where an exchange has been thoroughly organized for some years, the same conditions seem to prevail. The masons and bricklayers organized some four or five months ago, and formed a branch of the International Union. The contractors were notified at the first of the year that an increase of wages from 45 to 50 cents per hour would be asked for on April 1st. So far, although there is a large amount of work under way and coming out, the contractors have not consented to this increase; unless they do there will probably be a lock out to-morrow or next day. Most of the men have been getting the increased rate since the 1st of the month. This city seems to be the jumping off place for all comers from the east. This fact, in my opinion, accounts for the difficulty of maintaining an organization of either employers or employees. Much of the work now going on is in the hands of outsiders who have been here but a few months. The average number of bids for buildings let by tender and open for all comers is about fourteen."

The following is recommended as a good recipe for a black varnish for ironwork: Take ½ lb. of asphaltum and ¼ lb. resin, and dissolve in 1 pint of turpentine; rub 2 ozs. of lampblack with a little linseed oil to form a paste and stir this into the first mentioned ingredients.

TRADE DISPUTES.

As we are about to go to press, the pleasing information is received that a settlement has been reached between the master builders and the bricklayers who recently went on strike in Toronto. An agreement has been signed fixing the standard of wages at 37½ cents per hour, for one year from the first of the present month. The carpenters are demanding an increase of wages from 22½ cents to 25 cents per hour, and it is probable that some increase in wages will be granted to them. The recent strike of the brickmakers in the vicinity of Toronto has been settled, and operations have been resumed. The disturbance to building operations may therefore be considered to be at an end, and it is hoped that the temporary cessation of work may not seriously affect the prosperity of the present building season.

The strike inaugurated by the bricklayers was based upon a demand for only 1½ cents per hour above the wages which the employers offered to give. It was also declared in the face of an offer from the employers to submit the matter in dispute to the decision of the County Court Judge as arbitrator. When strikes involving serious disturbance of trade are instituted under circumstances like these, it becomes apparent that some means is urgently required of adjusting future differences between employers and employees in the building trades, and we trust that such means will be devised before the expiration of the agreement which has just been signed.

THE WASTE IN FURNACE HEAT.

S. HAMPTON RIPON.

I have been making a little calculation of the wasted heat due to leaving the leader pipes in furnace heating unprotected by covering material and I confess I am startled at the results disclosed. The waste un-checked, I am led to believe, is largely responsible for the dissatisfaction so often expressed at the magnitude of the coal bills and poor results therefrom.

Take as an illustration a furnace heating a small cottage; four 10-in. pipes to the first floor and three 8-in. stacks to the second. Consider the average length of pipe in each line to be 10 ft.; then we have 40 ft. of 10-in. pipe and 30 ft. of 8 in. leader in the basement.

Each 10-ft. length of 8-in. pipe contains 21 sq. ft. of surface, or 63 ft. in all. Each 10-ft. length of 10-in. pipe contains 26 sq. ft. of surface, or 104 sq. ft. in all, or a total of 167 sq. ft. in the basement leaders. Add, if you please, the casing of a 40-in furnace 48 in. high and, ignoring the top, we have 42 sq. ft. more. Now, under ordinary conditions it is safe to assume that the temperature of casing and pipes is at least 140 deg. We have here a total of 219 sq. ft. of surface radiating heat into a waste space with a surface temperature of 140 deg. Had we that number of square feet of radiation in a hot-water heating job we should consider it sufficient at that temperature to heat a room containing at least 4,200 cu. ft. of space, or, say, a room 15x28x10. Now, suppose the apparatus were to be wrapped first with a layer of asbestos paper and then with hair felt. I think all will agree that 25 per cent. of this waste heat would be rendered available. Probably most would claim a greater saving, but assume that for the sake of demonstration 25 per cent. of 4,200 cu. ft. is 1,050 cu. ft., or equivalent to a room 10 x 11½ x 9 warmed by waste heat. At an estimated cost of 10 cents per square foot, the entire bill for covering in this manner would be $21.90. The annual interest on this amount, allowing for gradual depreciation, etc., ought not to be 10 per cent., but we will assume that our householder values his money at that figure, so that the net annual cost would be $2.19.

Now, it needs no mathematical demonstration to prove to any one that $2.19 would be a small investment to warm a room containing 1,050 cu. ft. of space.

This then expresses a minimum saving; the practical, actual saving, all will recognize as being much larger.

Now I am wondering whether, in view of what is here demonstrated, it is not possible for those whose ambition it is to do the best work to persuade their customers to invest a little more in their heating plants to cover the dealer's expenses, and profits, he to cover the pipes in a scientific and workmanlike manner; not merely a single layer of asbestos paper, but a complete job as good or better than the one outlined here.

PERSONAL.

At the recent examination, Mr. W. F. Shepherd won first year honors in the Department of Architecture at the School of Practical Science, Toronto.

Messrs. Chadwick & Beckett, architects, have removed from their old quarters in the Saturday Night building into new offices in the Canada Permanent building on Toronto street, which has lately been completely remodelled, under the direction of Mr. R. J. Edwards, architect. Messrs. Chadwick & Beckett's offices now comprise one of the finest architectural suites in the city, being tastefully decorated and furnished.

The death is announced, on the 1st inst., at Thorold, Ont, of Mr. F. T. Walton, a well known contractor, in the 61st year of his age. The late Mr. Walton was a native of Hamilton, Ont. He resided for some years at Niagara Falls, during which time he erected the Niagara University, Loretto Convent, Spencer House and Brunswick House. He subsequently removed to Toronto, where he built the House of Providence, Loretto Abbey and St. Joseph's Convent. During the last eighteen years he resided at Thorold.

The Canadian Office and School Furniture Co., Preston, Ont., have found it necessary to build an addition, 36 x 38 feet, to their factory.

The Expanded Metal Co., Toronto, has been incorporated with a capital stock of $110,000 to manufacture expanded metal for fireproofing purposes.

Recently a marble block was taken out of the quarry of the Southern Marble Company in Pickens county that weighs over 100,000 pounds, and, so far as known, is the largest block of marble quarried in the world during modern times. The block of marble is almost pure white, and measures twenty-seven feet two inches long by four feet three inches wide, having in all the mass 500 cubic feet.

Mr. Raoul Aube, resident representative of the French syndicate which two or three years ago purchased the works of the Canada Stone Chinaware Co. at St. Johns, Que., has applied for an order of the courts to wind up the business. The business has been run in a very spasmodic way since the transfer, and the new proprietors appear to have had difficulty in getting all the stock taken up. Finally, friction developed between the Messrs. McDonald, the former owners, and the company, resulting in recent litigation.

Messrs. Darling Bros., of Montreal, have recently published a well printed and complete catalogue of the special appliances manufactured by them, and foreign devices for which they are the Canadian agents. Prominent among these may be mentioned the Webster vacuum feed water heater and purifier, which is largely employed in heating systems in large buildings, also passenger and freight elevators operated by hydraulic or electric power. A list of some of the buildings in which these appliances are in successful operation are included in the catalogue.

MANUFACTURES AND MATERIALS

LUXFER PRISMS.

Application has been made for a charter by a company which proposes to take over the business of the Luxfer Prism Company, of Toronto, and conduct the same on a more extensive scale. The new company which will have a capital of $400,000, have purchased a site for a new factory on King street west, and in addition to the manufacture of luxfer prisms will make artistic iron work and other building materials.

MARITIME CLAY WORKS.

The Maritime Clay Works, Limited, of which Mr. Robert Brownell, of Truro, is general manager, is the name of a new concern which is about to begin the manufacture of clay building materials at Pugwash, Nova Scotia, where the company control extensive deposits of the finest clay. The company's new works comprise a main building, 60 x 61 feet, dryers 60 x 100 feet filled with steam tunnels, 15 kilns, boiler and engine room. From sixty to one hundred men will be employed, including experienced clay workers from the United States. The class of goods manufactured, will embrace building and ornamental bricks; hollow building blocks, terra cotta, fire bricks, and tiling of all kinds.

FIREPROOF WINDOWS.

In our last issue appeared an article upon "Safety from Fire in Hotels," mention being made therein of the desirability of having the end of every passage open upon a balcony. "Over the door to the balcony," it was stated, "may be, framed in iron, heavy glass of the luxfer prism order, sufficient to illuminate the passage, but not likely to be soon injured by heat." Since this was written, more particulars about the fireproofing product of the Luxfer Prism Co. are to hand.

A brick test-house, assuming the nature of a furnace, was furnished with a large window made of 4-inch plate glass squares, glazed electrolytically in copper by the luxfer prism process. The test was witnessed last February by Fire Chiefs Bonner and Dale of Brooklyn, and Superintendent Anderson of the New York Board of Fire Underwriters, and a number of insurance experts, architects and builders. About one-fourth of a cord of pitch pine, mixed with resin, was piled on the grated floor. The match was applied and a few minutes later the great draft had raised the flames to such an extent that the plate glass was red hot. The rest of the story is from "The Insurance Press:"

"At that stage Chief Dale ordered his men to turn the water on, and the windows were cooled and the fire was damped. Then the doors of the structure were opened and the windows examined. They were found intact. The insurance experts then desired that the test be continued, and more resin and wood were piled in, and very quickly the terrific heat within made itself evident. The plate glass was cracked, but every square remained intact in its copper frame and did not even move before the full force of the hose when the fire was extinguished. Fire Chiefs Bonner and Dale, Mr. Anderson and Architect Le Brun expressed themselves as highly satisfied with the fire-resisting qualities of the Luxfer Prism Company's plate glass squares. The heat attained was more than 2,400 degrees Fahr." We may add that this and other similar experiments in New York and Chicago were made after the discovery that luxfer prisms successfully withstood the ravages of fire and water in buildings where disastrous conflagrations had occurred.

MANTELS AND GRATE FITTINGS.

In the show rooms of Messrs. Rogers & Son, Toronto, is a mantel of chase design, made of enamelled whitewood. The space immediately above the grate is filled in with glass and pearl mosaic set in white cement, the cement backing being held by an iron frame. A design in suitable colored glass serves to relieve the surface of the white glass mosaic. The top of the grate opening is bordered with brass, plated with gold, the andirons being of the same material. It is gratifying to know that the Toronto Ornamental Iron Co. have successfully made some wrought iron grate fixtures for the above firm, and that in future the attempt will be made to produce in Canada goods of this class which have always in the past been imported from abroad.

The craze for cheapness which prevails to so large an extent in this day is an obstacle in the way of firms who attempt to produce original and artistic goods in this and other lines. The masses appear to be satisfied with any kind of imitation, so long as it is cheap, and many manufacturers, with a keen eye for profits have planned to meet the demand by appropriating wherever they find opportunity, the designs of the better grade goods and by machine carving and other processes cheapening the cost of production to the required extent. To such a degree has this become the practice that the manufacturer of a well designed piece of furniture dare not give the same exhibition in a public window. Happily there is a more limited demand for all well designed and properly manufactured goods. Let us indulge the hope that with the increase of culture and wealth in this country will come public perception of merit and the distaste for shams.

THE COMPRESSIVE STRENGTH OF CONCRETE.*

AS DETERMINED BY TESTS MADE AT McGILL UNIVERSITY.

CONCRETE, especially in the construction of piers and foundations, is coming every year into more extensive use. It is therefore desirable to determine its strength, and more particularly the resistance to crushing, as it is to a compressive force that it is most often subjected. The results of very few tests with this end in view are given in any of the treatises on concrete or building materials, or in the engineering journals. A few results may be found, but they are scattered and very irregular, and little information can be obtained from them.

During the past three years a few tests have been carried on by the students of civil engineering at McGill University. The first series, two years ago, was to determine the effect of different percentages of water upon the strength, and the best percentage to use. This was found to be about 20 per cent. of the sand and cement. Last year tests were made comparing the strengths of concretes made respectively from an English Portland and a German one. This year tests

* From a paper by W. B. Anderson, Stud. Can. Soc. C.E., read Thursday, March 16th, 1899.

were made upon sand cement in order to compare it with the Portlands, and also to determine the best proportions in which to mix it in making concretes.

This cement was "Cathedral" brand sand cement, made by the St. Lawrence Portland Cement Co., of Montreal. It is made of equal parts of Portland cement and kiln-dried pump sand. These are run together into a revolving cylinder half full of flint pebbles, where they are thoroughly mixed and ground to an impalpable powder.

The conditions under which the tests were made this year were the same as those of the first series (published in paper No. 117, Trans. Can. Soc. C. E.), except that the blocks were made 9 x 9 x 12-in. instead of 12-in. cubes, as the cubes were found, in some cases, to be too strong for the testing machine to break. The blocks were tested with their long edges vertical, and rested on a steel plate which was on a ball and socket joint, the plate above the block being fixed. Sheets of rubber were inserted above and below the block to give a more uniform distribution of the load. The blocks were allowed to stand in the moulds for about two days, and were then removed and placed in water, where they were kept until the time of testing.

The results of all the tests made in 1898, and the more striking ones of other years, are here presented in tabular form:—

RESULTS OF EXPERIMENTS ON THE COMPRESSIVE STRENGTH OF CONCRETE.

No. of Test.	Date of Test.	Brand of Cement.	Mixture. Cement:	Sand.	Broken Stone.	Percentage of Water.	Weight in lbs. per cu. ft.	Breaking load lbs. per sq. in. One week.	Four weeks.	Two months.	Proportion of Mortar to Broken Stone.	Relative Amounts of Cement.	Relative Costs. First Assumption.	Second Assumption.
1	1896	German Portland "Hemmoor" Brand.	1	2	4	20	139.5	746	696	507	60-80	157	174	126
2	"		1	2	5½	"	.....	....	703	....	-100	137	152	121
3	"		1	2	6	"	.....	....	728	....	-120	122	135	116
4	1897		1	1	1	22½	142.3	×	×	....	60-30	367	407	206
5	"		1	1	2	"	146.7	1037	×	....	-60	275	305	175
6	"		1	1	3	"	148.0	×	×	....	-90	220	244	156
7	"		1	1	4	"	153.3	×	×	....	-120	183	204	144
8	"		1	1	5	"	151.2	×	×	....	-150	157	174	135
	"													
	"		1	2	2	20	143.5	494	565	....	60-40	220	259	150
10	"		1	2	3	"	146.0	611	555	....	-60	183	216	139
11	"		1	2	4	"	148.5	819	613	....	-80	157	185	131
12	"		1	2	5	"	150.5	581	680	....	-100	137	162	124
13	"		1	2	6	"	150.0	500	698	....	-120	122	143	120
14	"		1	3	3	"	139.5	333	205	....	60-45	157	185	122
15	"		1	3	4	"	139.0	....	366	....	-60	137	162	117
16	"		1	3	5	"	145.0	....	386	....	-75	122	143	113
17	"	English Portland "Anchor" Brand.	1	3	6	"	147.0	....	357	....	-90	110	129	110
18	1898		1	3	5	"	146.5	144	274	400	-75	122	122	104
19	"		1	3	6	"	146.4	110	182	218	-90	110	110	102
20	"		1	3	7	"	150.3	210	222	....	-105	100	100	100
21	"		1	2	4	"	150.6	316	441	....	60-80	157	157	119
22	"		1	2	5	22	148.5	275	477	494	-100	137	137	114
23	"		1	2	6	20	154.0	521	639	6,0	-120	122	122	111
24	"		1	1½	3	"	149.8	422	490	....	60-75	200	200	134
25	"		1	1½	4	"	151.5	446	679	....	-96	169	169	126
26	"	Sand Cement "Cathedral" Brand.	1	1½	4½	"	153.5	536	741	....	-108	157	157	123
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Blocks marked thus (×) remained unbroken under a load of 1,050 lbs. per square in.

Column 13 shows the relative quantities of cement in the different mixtures, and some attempt has been made to estimate the cost of the different mixtures on this basis. The relative costs are compared on the following two different assumptions:—

First assumption:—Column 14 shows the relative costs if it is assumed that the sand and stone can be secured on the spot and their cost ignored. The cost of different brands of cement is taken as below.

Second assumption:—Column 15 shows the relative costs of the different mixtures and brands on the following assumed costs per cubic foot of materials:

English Portland	53 cents.
German Portland	50 "
Sand cement	54 "
Broken stone	8 "
Sand	2 "

The cost of labour is not taken into account, as it will be the same in every case, and these costs can at best be only a rough approximation.

The main requisite for an economic and good concrete is to have just enough cement to completely surround every grain of sand, and just enough of this mortar to fill every interstice between stones. Column 12 gives the proportion of mortar to stone, and it will be seen that with each different mortar the strength increases as the proportion of stone increases, or as the volume of interstices between the stone decreases, because the mortar is not so strong as the stone. The strength also increases with the richness of the mortar in cement, so that the strongest concrete will be one with very little sand and a great deal of stone. Those with the 1-1 mixtures of mortar are very much stronger, though also more expensive than the others. The sand cements are found to be weaker than similar mixtures of Portlands by from 12 per cent. to 40 per cent. The manufacturers claim that with a mortar, such as a 1-10, with a great deal of sand, this cement is stronger than the Portland. This remains to be determined.

If the concrete is desired to have very great strength, a Portland cement and a rich mortar might be used, but if weight is the main consideration, with only moderate strength required, a concrete of sand cement will be much cheaper and quite efficient. Of course, much cheaper mixtures than the ones tested can be made, but they will be weaker accordingly after a certain limit is passed, which limit has not been reached in these experiments. One of the cheapest and a fairly strong concrete is No. 23. This mixture would seem to be the best one to use if excessive strength were not required.

The loads given in the table are the actual crushing loads. The blocks showed cracks or signs of failure before this load was reached, but it was thought better to make the comparison on this basis. For purposes of comparison it is best to take the results of the four-week tests, as the concretes then show more uniform results than at one week, and the two-month tests are not complete.

These tests are still very incomplete, and it might be profitable to make further tests with concretes containing more stone. The strongest of the sand cement mixtures is No. 26, and with this rich mortar it looks as if it would stand a good deal more stone, thus increasing both the strength and weight, and reducing the cost. Tests of this nature will likely be carried out at McGill University in future years.

CHARACTERISTICS OF GLASS.

Glass is bent in a kiln. Glass melts at 2,300°; the heat employed in bending is 1,800°. No pyrometer would stand long in that heat; it might last an hour, but it would not last a day, and so the heat of the kiln is judged from the color of the flame and other indications. By long experience and observation the expert glass bender is enabled to estimate the heat in this manner with accuracy. Smaller pieces of glass are put into the moulds in the kilns with forks made for the purpose. The great moulds used for bending large sheets of glass are mounted on cars, so that they can be rolled in and out of the kilns. The glass is laid upon the top of the mould over the cavity and is bent by its own weight. As it is softened by the heat it sinks into the mould and so is bent into forms. It may take an hour or two to bend the glass, which is then left in the kiln from twenty-four to thirty-six hours to anneal and cool. Glass to be bent, of whatever kind or size it may be, is put into the kilns in its finished state; the great heat to which it is subjected does not disturb the polished surface. Despite the exercise of every precaution more or less glass is broken in bending it. Bent glass costs about 50 per cent. more than the flat.

POINTS ON HOT WATER HEATING.

Mr. A. T. Hoyt, makes the following points in an article contributed to Heating and Ventilation, on the duties of a heating boiler: The circulation of water for heating purposes in radiators, box coils, or lines of piping, is a purely mechanical operation, and is controlled by mechanical laws. The fundamental law of mechanics is: what is gained in time is lost in power, and vice versa; or in other words, something cannot be made from nothing. In order to create a motion or a force of any particular kind an equivalent force or motion of the same or some other kind is required. A heating boiler is governed by mechanical laws, as surely as is the lever; it is simply a machine, and the circulation of water is its work. That which causes motion is called force, and that which stops motion is called resistance; they work against each other. Motion is simple and compound, uniform, accelerated or retarded.

These principles of mechanics enter as factors into water circulation. A heating boiler is a machine, and its duties as a machine are the scope of this article. As water receives no heat after leaving the boiler, neither does it receive any motion; its motion is really a retarded motion, from the time it leaves the outlet of the boiler until it reaches it again at the inlet. As the circumference of a circle, if revolved, can go no faster at any one point than at another, so the current of water in a heating pipe of uniform size cannot be fast and slow in any one line. It may be faster or slower in one line or part than another line or part; but in individual lines, the motion is uniform. Although the motion of water in the individual radiator is a uniform motion, water circulation is of the retarded class of mechanical motion. Boiler duty is thereby increased, as it has to create a current of force in itself sufficient to overcome the resistance met with in the radiation, and the current at the return inlet will be the power of the boiler, minus the resistance. In other words, the volume (velocity and area) and temperature at inlet of boiler, are the measure of the power of the boiler. This will be governed by the style, manner of laying out the radiation and its amount, &c.; but it is not in the scope of this article to touch on these matters.

The force of the current is established in the boiler, as it receives no accelerated motion after leaving the boiler; and as the heat is also given to it in the boiler, it is conclusive, therefore, that the boiler duty is virtually to cause and maintain a circulation of water, the temperature of which, as well as the velocity, is dependent upon another force, viz., heat. As the boiler is simply a machine, it can create no force, but is operated by a force, and as this force operates upon the boiler surface, its operative force will largely depend upon the construction of the boiler. As stated already, the water receives neither heat nor motion after leaving the outlet of the boiler; therefore it must receive its heat and also its motion from the fire, and its velocity and temperature will consequently depend upon the force or heat from the fire.

Boiler duty, or the duty an individual boiler will economically perform in water heating will, outside of its size, depend upon its construction. Water absorbs or receives heat from a fire, and also motion; and it may receive heat with little or no motion given to it from the fire; but it cannot receive motion without absorbing heat. The duty, therefore, a boiler will be capable of performing, will depend upon the proper construction of its fire furnaces, which should be such that the water in it will receive the greatest possible motion, this will ensure an absorption of heat; and the temperature, with the volume, velocity and area of outlet, will be the rating or power of the boiler.

There are three points to be considered in water circulation, and all devolve upon boiler construction. Fire is the primary cause of water circulation from a boiler through piping or radiation, back to the boiler again, and like a circle it has no end, as there is no point in the circulation where the flow ceases and the return commences. The terms flow and return, are only relative terms, designating the directional piping. Water is under the law of inertia, and if moved at all,

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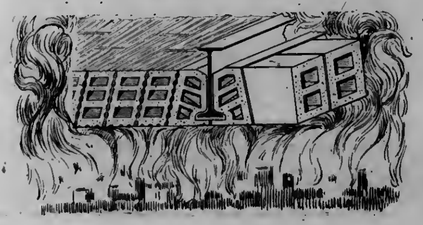

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VOL. XII.—No. 6. JUNE, 1899 PRICE 20 CENTS. $2.00 PER YEAR.

—THE—

CANADIAN ARCHITECT AND BUILDER,

A Monthly Journal of Modern Constructive Methods.

(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD).

PUBLISHED ON THE THIRD WEDNESDAY IN EACH MONTH IN THE INTEREST OF

ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

The C. H. MORTIMER PUBLISHING CO. of Toronto, Limited,
Publishers,
Confederation Life Building, - TORONTO, CANADA.
Telephone 2362.

Branch Office: NEW YORK LIFE INSURANCE BUILDING, MONTREAL.
Bell Telephone 2299.

SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to foreign subscribers is $2.50. Subscriptions are payable in advance. The Journal will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrears of subscription paid.

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The St. John Fire.

ON a May 25th, the city of St. John, N.B., was again visited by fire, which destroyed some 200 buildings in the north end of the city known as Indiantown, and left one thousand persons homeless. The burned district consisted principally of wooden buildings occupied by workmen connected with the saw mills and other industries of the city. There was a stiff breeze blowing at the time, which carried the sparks in all directions, resulting in the fire spreading to such a degree as to make it impossible for the firemen to check its progress. It will be remembered that this is the second great conflagration which has visited this city within the last quarter of a century. The important lesson which this occurrence seems to emphasize is the necessity of abolishing wood construction in the central districts of cities. The question of cost enters into the matter to a considerable extent, but in these days of electric railways those who cannot afford to build or rent brick houses must be content to live in the less populous districts, even at the expense of a little inconvenience.

Adjustment of Wages.

AN agreement has been reached between the Toronto Builders' Exchange, representing the Master Builders, and the Journeymen Carpenters, under which an increase of about five cents per hour will be granted the workmen in this line. It is gratifying to observe that in this adjustment the union principle that there shall be a minimum standard of wages for all workmen, irrespective of their qualifications, has been disregarded. On the contrary, the truer principle is recognized that workmen differ widely in ability, and the remuneration for their services should therefore vary in like proportion. The new scale of wages will range from 22½ cents to 27½ cents per hour, according to the ability of the workman. The Exchange has now under consideration a request from the Journeyman Plasterers for a slight

increase in wages. The strike in the building trades at Winnipeg has happily been adjusted. An understanding has also been reached in the case of the moulders' strike. Conditions in the building trades may therefore be said to have reached a settled basis so far as prices for labor are concerned, and projectors of new enterprises now operate with certainty.

The Age of Combines.

COMBINATIONS of capital and labor are the order of the day. The object of both is to secure profits. The outcome of the movement is being watched with the greatest interest. In the consolidation idea some of the manufacturing companies think they see the remedy for over competition, with its attendant reduction of profits, as well as a means of reducing operating expenses. There is another side to the question, however, and that is the side of the buyers and consumers of the products of these factories. They are beginning to cry out against the prices at which the consolidated manufactories have listed their goods, and in at least one instance a counter combine has been formed by the consumers. The largest railroad and other contractors in the State of Indiana are said to have arrived at an agreement for the purpose of fighting the great trusts which control the manufacture of the products which enter into their business. This agreement binds them to buy all their material from dealers who are outside of the manufacturers' organization, and to provide security, without the aid of the manufacturer, for the carrying out of their contracts. If this counter movement on the part of the purchasing classes should become widespread, the purpose of consolidation by manufacturing concerns would be nullified, and resort must be had to some other method, which in turn would probably soon be confronted by difficulties equally formidable. The equitable adjustment of industrial and commercial conditions, in the present complex condition of affairs, is a problem of the greatest magnitude. Time must be an important factor in the solution—if a solution is ever reached.

The Teaching of Art and Design.

There was printed in our issue for May a lengthy resolution recently adopted by the Executive Committee of the Canadian Manufacturers' Association, referring to the need of schools in Canada for the teaching of industrial art. The resolution calls upon the government to assist in the establishment of such schools. In the present number will be found a communication from Mr. S. John Ireland, Principal of the Hamilton Art School, which points to the fact that schools of the character called for by the above mentioned resolution have been in existence for a number of years past in several important centers of population in Ontario, and asserts that these schools are being assisted by an annual grant from the Ontario government, and are doing efficient work. Mr. Ireland further states that the Hamilton school has received little or no encouragement from the manufacturers of that city. Other charges of an even more serious character against the manufacturers are contained in Mr. Ireland's letter. Our Hamilton correspondent after having visited and inspected this school, gives his approval to the work which is there being done. This subject is an important one, and we shall be pleased to allow reasonable space for its full discussion. The question of what methods should be adopted for the education of the artisan classes, is at present occupying public attention in Toronto, Ottawa and other Canadian cities. Closely identified therewith is the special phase of the subject now under discussion in our columns. The attempt should be made to discover and demonstrate to the public satisfaction whether the existing schools, known as the Ontario Government Art Schools, are equipped and managed to insure the teaching of industrial art in the most efficient and successful manner. This would seem to be the first point to be determined. If these schools are not fulfilling the requirements, let it be shown wherein they are defective and whether there is the possibility of effecting changes which will render them satisfactory. If they are found to be working on wrong lines and to be largely inefficient, it might be better to replace them with something entirely new. If, on the other hand, it should appear that up to the limit of the support accorded to them, they are performing meritorious work, means should be at once devised to place them on a proper financial footing.

MR. REID'S MURAL DECORATIONS.

A CORRESPONDENT writes: "It has been a source of speculation with not a few whether the mural decorations at the City Hall, Toronto, are satisfactory to the Guild of Civic Art, and if work of this quality will be accepted by them in the future. If the work presented by Mr. Reid to the city meets their requirements, then it becomes a question whether they are to be entrusted with the selection of further mural decorations.

While admitting the degree of success Mr. Reid has attained in a new field, it must be candidly stated that judged absolutely on its merits, his work falls very far short of what may reasonably be expected in monumental work of this kind. A more uninteresting grouping in any of the subjects would hardly have been seen in the most ordinary occurrence of the events portrayed. We are also told that the costumes are incorrect, and if the originals were more picturesque, as surely they must have been, the oversight is unpardonable. There is also a lack of modelling of the figure shown through the clothing, which, for example in Walter Crane's work, gives so much greater value to the drawing, and which one may see frequently enough in muscular humanity of the humblest walks of life.

The general scheme of color is good albeit rather tame—indeed this word applies to the whole work, in conception, composition, drawing and colouring.

And while we are on the subject we are rather curious to know just what Mr. Walker in his address meant to say when he referred to the decadence of the conventional in decorative art and the development of a modern school. Surely the greatest modern exponents of mural decoration are conventional to a degree in the treatment of their subjects. The greatest charm to us of to-day in the tapestries to which he referred, lies in the quaint conventional treatment of the subject."

We learn from the Orillia Times that: During its erection a few years ago, the immense brick chimney of Miller's tannery settled on its foundations, giving it a decided slant, and causing the workmen to leave the top unfinished. Mr. Ed. Webb, bricklayer, has recently completed the job of straightening it, cutting out the bulges and setting it upright. He has also added twenty feet to the height, making it eighty-five feet. The chimney now stands perfectly straight.

TECHNICAL EDUCATION.

The meeting to discuss technical education which was held in the Rotunda of the Toronto Board of Trade Building on June 7th brought out very clearly that the subject is one of far reaching importance.

Whatever may be the fate of the present Peace Conference it is not upon war that the mind of the nations is now set. The struggle for supremacy is a commercial struggle and the hero of this struggle, the skilled artizan, is an object of much attention in educational circles.

The national bill for technical training in England is $7,500,000 per annum besides the amounts paid by municipalities. Belgium pays even more highly in proportion to size and population, but as a consequence is able to support a population greater than that of all Canada in an area less than that of Lake Ontario. We on the contrary have already sent to the United States, because we have no work for them to do, a population sufficient for the settlement of a country of the size of Belgium; and this is not because we have not the raw material for manufactures, but because we cannot work it. It is not want of capital that hinders us, for capital is always on the lookout for opportunities. Nor is it a market that is wanting, for the world is now a market to those who have anything to offer it; and that we have, if we are prepared to employ the young men we now send away, in manufacturing the raw material we now export into the manufactured articles we now import. But there is one proviso—that our standard of excellence is the world's standard, the standard of the best markets. We must enter into the modern game of competition of products which involves high training for the workmen who produce.

This change that has come over the world, has brought about a change in the conception of education and its application. It is not long since education was confined to men of leisure and the professions. The education which consisted entirely in cultivating the imagination and the capacity for abstract thought, or as its advocates would have said, to fill the mind with "beautiful images" and give it "just ideas," was adapted to the purpose it served of cultivating the mind to perceive and understand. It was training with the idea of culture. The process of culture may be described as letting the mind examine what men have thought, and what they have done merely for the sake of knowing what interested them, not for the sake of devoting ourselves to the same subjects of thought; that the mind, from the habit of placing itself at the point of view of many men and of many generations of men, may acquire that flexibility which is necessary to enable it to take a sound view in the new circumstances of life which present themselves. The process of culture is long and, though the result is valuable, it is only in some walks of life, and when it has been highly developed that its value can be reckoned in money. For this reason education has with some justice been considered as making rather for the unsettling than for the real good of persons engaged in such pursuits as agriculture or the mechanical callings. Indeed the result has shown that the too exclusive study of literature has indisposed young men for active pursuits in the past; they have flocked from school, not back to the farms, but to the cities, to take up the professions or teaching, or at least some clerkship which will give them a berth in town away from the drudgery of the farm yard.

This is the natural effect of a system of education which pays almost exclusive attention to cultivating the ideal faculties to the exclusion of the practical, which arouses the imagination in a direction foreign to that which constitutes the daily effort of practical life. It is an old complaint that the young man, who is ready to walk a thousand miles in a thousand hours, faints at the sight of a wood pile. At the bottom of our hearts we know that our sympathies are with him. Feats of physical strength or endurance appeal to our imagination. We do not abhor the reduction of the wood pile because it is useful, but because it is stupid. If the young man were trained to apply mechanics to this and to other operations of the kind, to accomplish them by thought and the skilled use of his hands, instead of by day in and day out drudgery, the life on the farm, and other varieties of the "practical" life would form a field for the application of what has called out his mental powers and interests his mind. All students of our public schools are likely to be more useful and happier for some technical training, and it would be well if our public schools tended this way in the closing years of their course, both for positive training of those who want it and will have no other chance to get it, and also that any natural tendency to mechanics in a youth may have its chance to develop, instead of the literary side of education being pressed at this critical juncture until there is one more young man who finds himself fitted only for the professions. If the mechanical bent makes itself felt, there should be technical schools which will take, for such as feel this bent, the place of the High School or Collegiate Institute. Technical Schools will be of course well equipped government schools, designed to give the students such scientific and mathematical training, such knowledge of mechanical forces and of machinery, such manual dexterity and skill in drawing as the language of the mechanical arts, that they will be fitted to apply themselves as intelligent workmen, in whatever industrial operation they may find employment.

Here will be supplied one part of the necessary equipment for manufacturing our own raw material. Technical education will not alone start factories, but it is a necessary condition of their success and will contribute to their institution. There is much manufacturing to be done before this country can be said to be doing the best it can with its opportunities. But this is also a farming country and agriculture wants a hand. It is by giving such a turn as this to education, that it will get what it wants. Farming is a scientific and mechanical operation. In farming districts the technical part of the public school work may have a special bearing on agriculture, indeed the Education Department of Ontario has already prescribed such work as optional for country districts, and promises to make it compulsory. Here then is briefly described what, to judge from the discussion at the meeting in Toronto, will be the recommendations of the committee appointed on that occasion. It will deal with the education necessary for artizans and working people. Masters of skilled labor, engineers who direct it, will need the higher training which is to be obtained at the School of Practical Science in Toronto, but for the rank and file all that is needed and indeed all that can be accomplished, is the elements.

In thus giving an industrial cast to the education, and therefore to the thought of the country, not however to the entire exclusion of literary culture, we shall be simply falling in with the spirit of our generation. The field of thought in the early days of learning was chiefly philosophical, later it was artistic and literary, in the present century it has been scientific, and we are now reaping the results in an exaltation of the engineer, the man who applies science to industrial and commercial undertakings. He has hold of our imaginations. He is the artist of this age, and the constant theme of Rudyard Kipling, the writer of this generation. Whether Mr. Kipling's writings will live or not is being discussed, but there is no question about their being alive now. The writer who has found poetry in railroading, freight steamers, engineering operations and the like, is the poet of this age. We read with pleasure because the ideas are our own ideas, though we had not realized it before. The approval of our generation is bestowed most readily upon those who subdue the earth to our use, and service in that way is coming to be regarded as the most honourable service.

ILLUSTRATIONS.

PUBLIC LIBRARY, WESTMOUNT, QUE.—ROBT. FINDLAY, ARCHITECT.

DESIGN FOR AN ANGLICAN CHURCH.—R. M. FRIPP, F.R.I.B.A., ARCHITECT.

BUSINESS AND RESIDENCE FRONT, YONGE STREET, TORONTO. —BURKE & HORWOOD, ARCHITECTS.

LEAVES FROM A SKETCH-BOOK.—BY STEPHEN A. HEWARD.

Abbey Farm, near Yeovil, Somerset, as the name indicates, has not always been a farm house, but like many other similar buildings, fell into disuse as a religious house at the time of the suppression of the monasteries—happier than the fate of many, however, it still exists, or partly so.

Its religious life must have been a short one, for the period of its architecture is late Gothic. The sketches and details of two of its doorways are pleasing specimens.

THE DRIARD HOTEL, VICTORIA, B.C.—JOHN TEAGUE, ARCHITECT.

This building, which is one of the most conspicuous and imposing in Victoria, stands at the corner of View and Broad streets. It is six storeys in height, and has accommodation for upwards of three hundred guests. It was erected from the designs of Mr. John Teague, a local architect, by Messrs. Elford & Smith, contractors, of Victoria, at a cost of about $250,000. A special feature of the building is the plumbing, which is said to have cost about $30,000. From the main entrance on View street, a broad staircase, with rich carvings in dark oak, affords communication with the upper floors. There is also a commodious elevator, with entrance from the main hall, and a winding stairway constructed of open ironwork leading from the dining hall on ground floor to the cupolas at the top of the building. The building contains 225 bedrooms, every alternate room being furnished with bath and lavatory—each bathroom and lavatory having means of ventilation apart from the bedrooms. The woodwork throughout is polished oak and cedar, and the windows are all fitted with plate glass.

BY THE WAY.

THE Ontario Historical Society is raising a fund for the erection of a monument at Niagara, to the memory of Laura Secord, the Canadian heroine, who, after the battle of Stony Creek, escaped from Indian captors and walked twenty miles, ten of which were through the enemy's lines, to warn Lieut. Fitzgibbon of an intended midnight attack by the Americans.

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IN preparation for the international exhibition the Eiffel Tower is being repainted. The time required for giving one coat of paint to the structure is about three months, employing constantly on the work fifty painters. For each coat over fifty tons of paint are used. The second coat will not be laid until the beginning of next year.

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THE commendable proposal has been made that opportunity should be given for the public spirited citizens of Toronto to contribute works of art to the new municipal buildings. Mr. Wm. Davies is the first to take advantage of this opportunity by presenting a fine water color drawing, by Wadham, an ex-President of the Australian Society of Artists. Mr. Alex. Manning, ex-Mayor of the city, who is known to be the possessor of a valuable picture collection, has intimated his intention to become a contributor.

A CORRESPONDENT writes to the Toronto Globe in in criticism of Mr. G. A. Reid's mural paintings in the municipal buildings. He says the pioneer backwoodsman should have been depicted as wearing knee breeches and buckled shoes, which was the style of dress in vogue at the period of the first settlement of this country. The writer points out that the fashion of wearing trousers was not introduced until between 1830 and 1840. In reply to this, another authority states that the style of dress should properly conform to the early history of the city of which the building is the type. The author of the paintings has taken his departure for a season of rest in the Adirondacks, leaving the critics to settle the dispute as best they may.

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A correspondent of the Toronto Globe describes church building methods and architecture in Dawson City, as follows: "Dr. Grant, who is from Toronto, Canada, * * * * turned his attention to building the First Presbyterian Church, and never did I know of any person who could work as hard and so long as that same doctor; and as there was no night at that season, the sun shining 22 hours, it seemed as though he worked all the time; sawing logs, packing moss, etc., until the church was finished. It was built wholly of logs, with a thatched roof of the moss which grows everywhere in that country. The interior was of the same logs with the bark peeled off, making it light and airy. It had windows containing glass, which is a great luxury in the far north. The seats were benches, smooth and comfortable. A nice planed floor, a table for the altar and a large stove. It was lighted by coal oil lamps, which were almost impossible to obtain.

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MESSRS. Fraser & Chalmers, of Chicago, who are extensive manufacturers of iron pipe, are credited with saying that "Foreigners have sent many orders here for machinery, steel rails, water pipe, ship plates, pig iron and other things, because they could not get them in Europe. Down in Australia it was proposed to establish some extensive waterworks, which would require 70,000 tons of iron pipe. That is an enormous order. The colonial authorities took it to England, but found they could not get bidders for more than 6,000 tons, and, as a consequence, the remainder of 64,000 tons was bought in this country." The question to which this statement gives rise in my mind is, why did not Canadian manufactories, of which there are several of large capacity, get a chance to tender for the supply of this large quantity of pipe for Australia? Presuming that the British manufacturers know something about our facilities in this line, it would seem to have been their duty to have directed this order to Canada when they found it impossible to fill it themselves.

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THERE are some interesting peculiarities about the architecture of the island of Manilla, the scene at present of guerilla warfare between the United States troops and the native soldiery. One of the most dsitinctive features of the houses on this island are the windows. The better class of houses have window frames which slide in grooves, so as to be opened or closed as desired, and in these are set the couchas, which soften the bright tropical sun rays. As a further protection against light and heat, blinds are used which run in the grooves with the windows. Oyster shells take the place of window glass. The shell is nearly round, about 4 inches in diameter, compressed, and so thin that it is nearly transparent. In appearance the interior of the shell resembles isinglass, with opalescent tints, the exterior being slightly rough. The animal is so exceedingly flat that when the valves are closed they apparently touch. This is probably the same species of mollusk which is known in China as the Chinese window oyster and which is used for windows, lanterns and similar purposes. These ingenious people also powder the shell, which they use for silver in their water colors

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

THE article in the last issue of the CANADIAN ARCHITECT AND BUILDER, entitled "The Teaching of Art and Design," containing a resolution adopted by the Executive Committee of the Canadian Manufacturers' Association would certainly have the effect of causing anyone interested in the Schools of Art of the country to open his eyes. We have been accustomed to think that these Schools were properly equipped for the very purposes desired by the manufacturers, the instruction in the principles of design and the development of talent that will lead to a supply of practical designers in every branch of trade that has occasion to employ designers. And yet the resolution tells us "There are no existing schools constructed or equipped to meet the necessities herein alluded to."

In consequence of this sweeping assertion I paid a visit to the School of Art here with the object of finding out for what purpose it existed, if the Manufacturers statement is true, for certainly no school could have a right to its government grant if it were merely a "drawing" school, without any better object than the simplest instruction in drawing, which is what the resolution would make one think is all that these schools can give.

My first impression as a result of this visit, is that the Manufacturers do not know what is going on under their eyes; at any rate they do not know the Hamilton School of Art; of other schools I cannot speak from personal knowledge. But here I find students engaged in the study of design for wall papers, floor-cloth, brass-work, furniture, wood-carving and ornament for all purposes, from the manufacture of iron stoves to delicate stained glasswork. There are classes for modelling in clay, for the study of architecture, classes for sculpture, machinery drawing and all the usual work of the various grades. The text books used are those in use in the Art Schools in England and the Principal of the school, Mr. S. John Ireland, is a man of very many years experience in the art schools in England, a man who for years, ever since he has been in this country, has held the position of examiner for at least two great English Schools, who have thought it to their advantage to send out the students' work to him year after year for examination.

Of course "the proof of the pudding is in the eating," and no matter how highly a teacher may be recommended, if he cannot produce the results required of him in his position, he is no good. We have only to look at the work of the pupils and ascertain the results achieved by them to learn the truth in this particular. Several students of this school have obtained medals in acknowledgement of the excellence of their work. Prizes have been awarded in exhibitions far and wide. To mention one case in particular, a design for wall paper that was sent to the Worlds Fair at Chicago not only obtained a silver medal, but was the means of bringing a student all the way from Chicago to study in Hamilton under Mr. Ireland.

I saw several designs for ornamental brasswork, stained glass, lace, wall paper and carving of a very high degree of excellence, and yet the manufacturers to whom these designs have been submitted, while acknowledging their quality and expressing surprise that such work could be done here, did not care to make any use of them or their authors.

It is self-evident then, that for some reason or other, the manufacturers here consider the school a failure as far as their interests are concerned, and it would certainly be to the interest of the public as well as to them personally that they should speak out and say where the difficulty lies. I have not had the opportunity of hearing from the manufacturers, but I have no doubt many will be ready to take up the subject when it is brought to their notice in the columns of this paper.

Another point in connection with the Art School that has been agitating a good many people here lately, has been the earnest desire of the members of the Y. W. C. A. and Technical Institute to have their Technical Institute amalgamated with the Art School. Mrs. John Hoodless, President of the Y. W. C. A. has been working with strenuous efforts to bring this about. The matter has however been decided against her by the Directors of the Art School on very good practical grounds. The idea is acknowledged as a good one, but the first consideration would be a new building capable of holding both establishments and there are no funds available, nor is there any likelihood that any could be raised. The Art School does not see the advisability of saddling itself with the responsibilities of the Technical Institute, but at the same time the Directors would like to see a Municipal Technical School established.

A meeting of citizens of Hamilton was held recently in the Mayors' office, when it was decided to form the Hamilton Improvement Society based on the lines of the New York City Improvement Society for the beautification of the city. A Committee was appointed to draft a memorandum embodying the scope of the Society.

R. W. GAMBIER-BOUSFIELD.

PERSONAL.

Mr. Harry Edwards, son of Mr. W. A. Edwards, architect, of Hamilton, has recently gone to New York for the purpose of studying architecture.

Messrs Geo. W. Gouinlock and F. S. Baker, two well-known architects of Toronto, have recently formed a partnership, under the title of Gouinlock & Baker, with offices at No. 714 Temple Building.

Mr. J. A. Sheedy, Master of Bridges and Buildings of the Grand Trunk Railway, has resigned and accepted a position in Philadelphia. The members of his staff presented him, as a token of esteem, with a silver tea service.

Mr. William Burke, who was for many years a dealer in builders' supplies on Richmond street West, Toronto, and who represented St. Andrews Ward in the City Council in 1877, died at his residence a few days ago, aged 77 years.

The death is announced at Ottawa of Mr. James Strachan, a well-known contractor of that city. Among the buildings which he erected may be mentioned, the Macleod Street Methodist Church and an addition to St. Andrews Church. The late Mr. Strachan was a native of Scotland, and was 73 years of age.

Herbert E. Gates, architect, of 58 Bedford Row, Halifax N. S., was married in England some time ago to Miss Sillery, daughter of the late Staff Captain Sillery, formerly of H. M. Ceylon Regiment, and niece of the late Major General Sillery, commanding the 12th (the Suffolk) Regiment.

Mr. W. J. Holland, architect, died at the General Hospital in Collingwood last month from consumption, at the age of 51 years. The deceased had for some time practised his profession in Collingwood. Prior to taking up his residence in that town, he lived in Barrie and Toronto. Among the prominent buildings which he designed are the Cyclorama Building on Front street, Toronto, and the stores of Messrs T. Long & Bro. Collingwood. He also prepared the first plans for the Market Building in Collingwood.

PUBLICATIONS.

The June number of the Review of Reviews has an illustrated article on summer reading, giving a rapid survey of the important books just issued from the various publishing houses.

Among the papers and brochures at the recent meeting of the Royal Society were three by Mr. Chas. Baillarge, of Quebec, entitled respectively "L'Antiquite de la Terre et de L'Homme," "La Vie—L'Evolution—Le Materialisme," "Le Grec—Le Latin—Leur utilite pour apprecier la signification des mots actuels de la langue, et dans la composition de nouveaux mots motives par les progres des sciences, arts et manufactures. Leur enseignement dans nos colleges." Mr. Baillarge is widely known as a versatile and prolific writer upon scientific subjects.

ARCHITECTURAL CLUBS.

ARCHITECTURAL societies naturally, owing to the different fields of usefulness in which they operate, have divided into two classes—those that look after the professional interests of their members and those whose members look after the interest of architecture as an art. True, some of the former have endeavored to do both, but never to the satisfaction of those who espouse the cause of the latter; in fact, it was this dissatisfaction which led to the establishment of the latter. Now, however, clubs that look after architecture as an art hold an acknowledged position with the loyal support of the clubs that look after the professional interests of their members, and find that their interests in no way conflict, but rather supplement and assist one another.

Architectural clubs that look after the interest of architecture as an art are not so long nor so systematically organized as those that guard the professional interests of their members, and consequently have objects and aims that are not widely understood, while their own work has an educational influence which keeps constantly extending their usefulness. Their object is the promotion of good designing and draughting, with a practical knowledge of the many subjects with which an architect is called upon to deal; to bring together the architect, sculptor, painter and art worker that they may learn of one another, harmonize their points of view, and work together on the opportunities that occur and may be made to occur by being brought under each other's influence. An unexpected, but very far reaching—on might almost say—duty, has devolved upon them, the performing of which is sometimes resented, sometimes looked upon with suspicion and sometimes accepted with thanks, but will no doubt yet be sought when its aim is thoroughly understood and appreciated. This is their influence in municipal affairs where opportunities and money are invariably not only wasted, but used to blemish our cities, of which we are all proud. Why should not schools be structures of good taste and refining influence? Would it not be part of the education? It does not mean more money but more thought of the proper kind; likewise the beautifying of parks, the grouping where possible of public buildings and the decorating of same already built or building. Again, opportunities of beautifying cities are often lost by it being no one's business to advocate them or point them out; this architectural clubs make their's, and watch all opportunities with the object of suggesting and assisting when possible. In a word, to the outside citizen the architectural club is a body whose members are by training and occupation, in a position to speak and be listened to on matters of civic improvements. With these views, and with some, these experiences, more than one hundred members of architectural clubs met in Cleveland, Ohio, on June 2nd and 3rd last, representing thirteen clubs having had one visiting delegate as follows:

Boston Architectural Club.	Irving T. Guild.
Architectural League of New York.	Julius F. Harder.
Society of Beaux-Arts Architects, New York.	John E. Howe.
Pittsburg Architectural Club.	John Comes.
Pittsburg Chapter, A.I.A.	W. J. East.
Detroit Architectural Sketch Club.	J. W. Case.
Chicago Architectural Club.	Joseph C. Llewellyn.
St. Louis Architectural Club.	William B. Ittner.
Cleveland Chapter, A.I.A.	Charles W. Hopkinson.
Cleveland Architectural Club.	Herbert B. Briggs.
Toronto (Canada) Architectural Club.	J. P. Hynes.
T-Square Club of Philadelphia.	Adin B. Lacey.
Illinois Chapter, A.I.A.	P. B. Wight.

The programme was as follows:

FIRST DAY, FRIDAY JUNE 2ND.

9 A.M.—Registration of delegates, rooms of the Cleveland Architectural Club.

10 A.M.—Meeting opened by President of Cleveland Architectural Club, Mr. Albert E. Skeel. Mr. J. C. Llewellyn, President of the Chicago Architectural Club was then elected chairman of convention, and Mr N. Max Dunning, Sec. of Chicago Arch. Club, secretary. The chairman then outlined the object of the convention.

Roll call.

Appointment of press committee.

1. (a) "Club-Organization and Management." Adlin S. Lacey, T. Sq. Club.
   (b) Resume of club work. Outline from each delegate giving short history and concise statement of his club's work and organization. (Remarks limited to three minues each)

   Discussion.
2. (a) "The Annual Exhibition." Mr. Henry W. Tomlinson, Ex. Comm. C. A. A.

   Discussion.
   (b) Appointment (on motion) of committee to arrange schedule and circuit for exhibitions for 1900. Also to make arrangements for judges, packing, shipping, etc.
   (c) Appointment of National Exhibition Committee (by nomination) to solicit foreign exhibits.
3. Paper: "Code Governing Competitions." Mr. J. F. Harder, Archt. League, N.Y.

   Discussions.
4. General discussions (and references to committees) of such subjects as may develop at the convention.

8 P.M.—"The Grouping of Public Buildings." Mr. H. K. Bush-Brown, Archt. League, N.Y.

SECOND DAY, SATURDAY JUNE 3RD.

10 A.M.—Meeting called to order.

Roll call.

Reports of committees.

1. (a) "The Architectural Society and its Progressive Influence." Mr. Albert Kelsey, T Sq Club, Phil.
   (b) Letters from schools as to the educational scope and province of Architectural clubs.
2. "The Modern Phase of Architecture." Mr. Louis H. Sullivan, C. A. A.
3. "The Ope ation of the Illinois License Law" Mr. P. B. Wight, Sec'y. State Board of Examining Architects.
4. Open for general discussions.

The programme of entertainment as outlined by the Cleveland Club was as follows:

Friday afternoon, a Tally Ho ride to points of architectural interest in Cleveland.

Saturday, a visit to the Olney Art Gallery.

Saturday evening, a reception and banquet at the rooms of the Century Club, on the 15th floor of the New England building.

TOASTS.

Herbert B. Briggs, Cleveland, Toastmaster.

Welcome — Benj. S. Hubbell, Cleveland.

Music.

Response — The New President. Albert Kelsey, Philadelphia.

Music.

"What We Gain by Concerted Movement," — Wm. B. Ittner, St. Louis.

Music.

"Reciprocity between Architectural Clubs and Architectural Publications," Irving T. Guild, Boston.

Music.

"The Architectural School from an Architect's Standpoint," Geo. R. Dean, Chicago.

These deliberations resulted in the formation of the "Architectural League of America," which title was substituted for the National Architectural League owing to Toronto being represented at the convention.

The proceedings of the convention will be published, and as it will be interesting reading later, I will not anticipate here. The delegates might be generally described as young men and practicing architects, with a noticeable capacity for hard work, as may be instanced by the committee sitting up till three in the morning and again at work by six in order to report to the convention, which, unfortunately, only sat two days. It was also an evidence of their enthusiasm for their profession, which, like the "one touch of nature which makes the whole world kin," gave the delegates common ground on which to meet, and by the time the first session was over it was hard to realize that few of these men had ever met before. So much at home were they with each other that one felt more as if at a college reunion than at a first convention of an association representing ten cities.

The discussions that occurred during the sessions were interesting and animated, especially when it turned on precedent, which might be described as the debating ground of architecture in America to-day. The earnestness on both sides was evident, but the confidence of being right and the strength of argument seemed ever with the anti-precedents.

The local Entertainment Committee sent each delegate away heavily indebted to them for the place of meeting, the rooms of the Associated Technical Clubs (one of which is the Cleveland Architectural Club), for their tally-ho drive and their banquet, but most of all for their personal attention, the value of which to a stranger in a strange city can only be appreciated by being experienced, and not described.

Returning from the Convention, Mr. Adin B. Lacey, President of the T Square Club of Philadelphia, together with his wife, accompanied Mr. J. P. Hynes, the Toronto delegate to Cleveland, to Toronto for a short visit. On Tuesday the sixth of this month, the Architectural Club entertained Mr. Lacey at a lunch served at Webbs, and the members present were priviliged to hear from the lips of the President an outline of the T Square Club's very interesting history. That this club has won no small fame, is due to the untiring efforts of its officers and members. From small beginnings, working consistently for improvement of the architect as a designer, and for the enlightenment of a public blind to real merit in the architect's work, the T Square Club has become a power for good in the Quaker City.

If that latent enthusiasm for their art, which it is hoped Toronto architects possess, might germinate and find in some sort of organization, existing already, or new opportunity, to do for Toronto a tithe of what the T Square Club has done for Philadelphia, Mr. Lacey's visit will not have been in vain.

J. P. HYNES.

THE CLASSIFICATION OF BUILDING STONE.

The majority of stones used for any form of structural or decorative work may be roughly classified under three heads. The crystalline, siliceous rocks, which include the granites; the calcareous rocks, including all limestones and dolomites; and the plastic rocks, including the sandstones and clay slates. Those of the first group have been formed from molten matter, erupted from the earth's interior or from the metamorphism of siliceous sediments; the origin of the second group is deposits of calcareous mud from the breaking up of shells, corals, and the remains of other marine animals on an old sea bottom; those of the third group result from the breaking up of older rocks, and the accumulation on the bottom of lakes and seas of the resultant sand, clay, or mud, in beds of varying thicknesses, to be subsequently gradually hardened into stone.

The essential difference between a marble and a compact common limestone, is that the first has undergone, through the combined action of the heat and pressure, just the right degree of change, or metamorphism, to develop in it crystallization and color. The essential difference between a brick of fire clay, and a cleavable slate used for roofing, is that the first named still retains its plastic condition as it was laid down in the form of fine silt on a sea bottom, while the slate has, by geological agencies, and by actual movements of the earth's crust, been so squeezed and compressed as to lose all resemblance to its former self, and to become the cleavable article of commerce we now find it.

Since these processes of change are dependent very largely upon the actual movements, warpings and foldings, as may be said, of the earth's crust, and the heat and chemical action which is thereby generated, and since these movements only take place with extreme slowness, whole geologic ages being occupied in their conception and completion, it follows, as a matter of course, that metamorphic rocks, like granites, marbles and slates, are found only among the older rocks, and only in those portions of the country where this crust has been wrapped, compressed, and folded, as in the process of mountain making. In other words these rocks are to be expected in their best development only in places bordering along more or less extensive mountain ranges.

ENGINEERS' CLUB.

During the last three months several meetings of civil engineers, architects and surveyors, resident in the city of Toronto, have been held for the purpose of organizing an engineers' club, on the same basis as similar organizations in Detroit, Cleveland, St. Paul, Denver, Rochester and many other cities in the United States.

The organization has been completed by the election of the following officers for the current year: President, Kivas Tully; vice-president, C. J. Crowley; secretary, Willis Chipman; treasurer, T. B. Speight; directors, C. H. Rust, E. B. Temple and A. L. Hertzberg.

Regular meetings will be held on the first Tuesday in each month except the months of July and August, and the annual meeting on the first Tuesday in February.

All classes of engineers, civil, mechanical, sanitary, electrical hydraulic, mining and military, professors in engineering and architecture, architects and land surveyors are eligible for membership.

The Club starts with but forty members. It is proposed to arrange for a down town club room next year.

It is not the intention to permit the Club to usurp the functions of any of the existing professional or technical societies, the principal object being of a social character.

CORRESPONDENCE.

THE NEW YORK FIREPROOFING SCANDAL.

To the Editor of the CANADIAN ARCHITECT AND BUILDER:

SIR,—I have before me several copies of the New York Tribune, containing a full report of the investigation now taking place before a committee appointed by the State Legislature to inquire into Tammany's transactions with reference to fireproof construction and other matters of civic interest, which apparently lays bare a system of corruption almost beyond conception.

Before the advent of Tammany into power, public tests of different systems of fireproof construction had been made under the direction of Mr. Stevenson Constable—at that time Superintendent of the Department of Buildings, New York—and as the result of those tests Mr. Constable prohibited the use of concrete and metallic systems in the construction of fireproof buildings of the first class in that city. That his reasons for prohibiting such systems were sound, the following report taken from the Engineering Record, Sept. 25th, 1896, No. 359, will show:

"A Roebling concrete arch, which we are justified in presuming represented the standard construction of that company, loaded with 150 lbs. per sq. foot, was subjected to firing for five hours. Upon re-opening the doors before putting water on, it was seen that all the plaster and metal lathing had burned off, except in the extreme corners." Maximum temperature, 2,300 deg.; maximum deflection, 4.485 in.

"Mr. Constable was restrained from further interference"! Why?

Mr. Constable was sustained in his action by the department and an ordinance was passed by which the use of concrete systems was prohibited in buildings of the first class, which were specified to be of fireproof construction.

Whether the superintendent was justified in the stand he took, is a question every unbiassed student can answer for himself.

But with the coming of "Tammany" into power a change took place. Previous ordinances were either abolished or amended, and concrete and metallic lath systems are not only given precedence to porous terra cotta and hard tile constructions, but have been practically granted a monopoly of civic work. Why the change? The evidence of Mr. Himmelwright, of the Roebling Company; Mr. Watson, of the Expanded Metal Company; Mr. Wright of the Columbian Fireproofing Company; Messrs. Tostevin and Hayes and others with similar concrete systems clearly tells us. Mr. Croker jun. received $17,000 in stock, which he says he paid for, and $2,500 per annum from one company to LEARN THE BUSINESS; Mr. McCann, (a nephew of Mr. Croker, sen.,) $5,000 cash and a prospect of $10,000 more for his influence; nor are Con. Daly, Mr. Hinckley and Senator Grady,—ward politicians—forgotten, as it appears each had been seen on the subject.

Will architects endorse Mr. Constable's decision? A great responsibility rests with them, and it is plainly their duty—not only to read, but to analyze every statement placed before them, and to use that only which is good and trustworthy.

Let them study Constable Stevenson's tests; the Denver tests of 1892; the Pittsburg conflagration of 1897—one of the severest tests that modern fireproofing has been subjected to; The Home Life and Postal Telegraph Buildings fire, 1899 (Mr. Burke, architect, of Toronto, in a paper read before the Association of Architects of Ontario, sums up the results of the Pittsburg conflagration as follows: Porous terra cotta, 1st; hard tile, 2nd; concrete, 3rd); the Ottawa Parliament Buildings fire, 1898; the experiments of Professor Dobie, Toronto School of Technology—and Professor Webster, of London, England—on the behaviour of concrete under the action of fire and water, and I am convinced they will use great caution before adopting systems which may, and probably will, lead to disappointment and disaster.

Many patents for concrete systems have been issued in Great Britain since the year 1811, but I have yet to learn that any one of them proved a success; or successfully stood the brunt of a serious conflagration.

I am, yours truly,

N. T. GAGNON.

The Central Ontario School of Art and Industrial Design Toronto, has petitioned the city council, to appoint one of its members a director of the school. At the recent annual meeting the following gentlemen were elected as the officers of the school for the current year: R. Y. Ellis, president; W. A. Langton, vice-president; B. McEvoy, James A. Smith, S. G. Curry, R. McCausland, S. M. Jones, F. S. Challener, directors; Geo. C. Downes, secretary.

THE TEACHING OF ART AND DESIGN.

To the Editor of the CANADIAN ARCHITECT AND BUILDER.

SIR,—The article on the above subject in your May issue calls for some comment. I for one feel delighted that you are able to state "It is gratifying to observe that in Canada this subject is attracting attention," and I fully endorse your opinion "as to the importance of the relation which should subsist between the teaching of art and design and the development of a nation." But surely some of the clauses in the comprehensive resolution adopted by the executive committee of the Canadian Manufacturers' Association on 28th April last must have been adopted either in ignorance or purposely to pervert facts with a view perhaps to induce the government to pay the entire cost of educating apprentices.

The first six paragraphs contain the well worn platitudes of after dinner speakers, only that an important omission occurs, viz., that the tide has turned back on France, which 50 years ago sent designers to England to such an extent that nearly all the chief positions were then filled by Frenchmen, while to-day scores of English (South Kensington system men) are filling positions as designers in France and in their chief industry too, viz., that of silk manufacture.

The report goes on to state, in par. 7, "In Canada no strong effort has yet been made to develop in our schools the art needed in our manufactures. While our industrial establishments are giving every sign of extensive development and expansion, every facility should be afforded by our government to supply competent designers to them and in no way can this be so well done as by equipping and supporting industrial art schools, where art and technique work hand in hand."

I must take issue with this report. 1st, there has been a fairly strong effort made by the Ontario government to supply this need, as art schools have been established in Toronto, Hamilton, Ottawa, London, St. Thomas, Kingston and Brockville; but it is the Ontario manufacturers themselves, with but few exceptions, who have done so little to aid these schools financially, or to give employment or encouragement to the students who have been trained in them. Taking Hamilton art school as an example, situated as it is in a manufacturing centre, the government gives a grant of $400 and about $150 more for certificates taken. This is not bad, but when compared to a similarly situated school in England having about 200 students (the number annually enrolled in Hamilton), the English government would grant about as many pounds sterling and pay the expenses also of the Principal while visiting the metropolitan museums and industrial art exhibitions, and sometimes in foreign countries as well. The government there pay also 50 per cent. of the cost of buildings and equipment, the manufacturers subscribing the bulk of the remaining 50 per cent. besides liberal donations towards annual expenses and local prize funds—and no doubt the government here will do the same when the manufacturers take the initiative.

In Hamilton I am sorry to say the names of manufacturers are almost conspicuous by their absence from any list of subscribers. Even when this school was started in 1886 and forty citizens subscribed $50 each, only six manufacturers' names appear, two of whom make soap, and one, factory-made clothing; these have little use for design in their business, leaving only three others who could use designs—but even these three do not employ a designer between them; they get their "patterns" from the States. There is the same lack of support to our annual expense fund, for we get a sum not exceeding $10 from manufacturers, while other citizens subscribe more liberally.

In paragraph 8 of report, it stated: "It requires years to develop acknowledged lines of design in art," etc. True, and if fairly dealt with it will take time to regain confidence. I have heard many sad accounts from other Canadian cities, but must take them as heresy; I do know, however, that out of hundreds of students in this city, scarcely any have been able to earn a livelihood in Canada—in fact they might graciously give their services to Canadian masters—but had to go to the United States to earn an adequate salary. Let me quote a few instances of those who have secured employment here. The manager of a large factory has been antagonistic to this school for ten years because he has to pay $1000 a year to each of two employees, who improved themselves by studying with me, and he has bemoaned that prior to the advent of the art school he got these hands for about half that sum. When asked if he would dismiss them, he replied, "They are good help, and maybe I should have to pay more if I got Englishmen or Americans to do the work they are doing." Another firm employing a man to work a machine, hearing that he was attending classes at the art school gave him at first a little drawing to do, then more and more, and when the man asked for a slight increase in pay he was sharply told "No! we can fill your place many times over in half an hour." He having a family, had to accept the old rate of wages or leave the city to get other work. Another firm on hearing that an apprentice was attending the evening class, brought work from other departments for this apprentice to do, besides his usual work, but not one cent was paid for it, and worse still, for three months in the winter when work was slack this apprentice was paid off and might starve for all the firm cared.

Paragraphs 11 and 12 state: "Whereas there are no existing schools constructed or equipped to meet the necessities herein alluded to, resolved, that this association use its efforts to induce the proper authorities to establish or contribute to the support of schools of art and design in the manufacturing centres of the country that will promote the growth and development of our industrial institutions." These schools are already in existence. They have been getting some help from the government for many years. We need more, and possibly would get it if the manufacturers seemed disposed to bear their share of the burden. Now sir, let me state, that it is a most difficult thing for a young designer to get a Canadian manufacturer to purchase a design, no matter how good it may be, as the custom has been for years to reproduce only articles designed in other countries—pirating the design—and is it any wonder we hear grumbling on all sides that Canadian made wares do not find foreign purchasers when they have no distinctly Canadian characteristics of either novelty or beauty? Allow me also to draw attention to another reprehensible practice, viz., when a designer offers his designs for sale he is frequently asked to "leave them, as the 'manager,' or 'gentleman,' who attends to this is out at present but the designs will be shown him when he returns; call again, please." This time the designer is informed the firm regrets being unable to purchase the designs at present—they are good practicable, saleable things, and there should be no difficulty in disposing of them; but the firm do not inform him that they have taken either photographs or tracings of them, or even put them in execution with slight modifications during the twenty-four hours of possession, or will do so in a year or so. To check this dishonesty the government should grant greater facilities for copyrighting designs, and then make it as much a penal offence to steal the product of brains as objects of material value.

The resolution leads one to think this committee consider there is not a school or an art master in Canada. I will speak for myself and leave others to do the same for themselves. Without egotism I wish to inform them that there are few English art masters who have had better training in all branches of technical design than myself, having devoted 30 years to this work, studying at South Kensington during seven years of this time, and I have visited France, Belgium, Holland, Switzerland and Germany on various occasions to gain knowledge on this subject. In regard to this school, I must inform them that the premises of the Hamilton art school were specially built and equipped for this work. In it will be found thousands of copies of the best examples of industrial art. The manufacturers may have been influenced by some of their employees who discredited the work which is being done. As an instance, some time ago two of my students sent some designs for sale to a large manufacturing concern. The reply came that the company were surprised that designs as good as those submitted could be made in Canada, but their buyer decided it was still necessary to go to France twice a year for designs. Of course any one could see this man's semi-annual trip would be stopped if Canadian designs were used. I have some of these designs by me, and the letter received in reply, which I will show to the Editor of the CANADIAN ARCHITECT AND BUILDER should my statement be discredited. I will also give him in confidence the names of the firms and employees referred to in this letter. Apologizing for taking so much of your space, I remain sir,

Your obedient servant,

S. JOHN IRELAND,
Principal Hamilton Art School.

LEGAL.

Alexander McFarren, a ratepayer of the city of Toronto, recently brought action against the Public School Board charging them with having violated the plumbing by-law in connection with the sanitary system in use in the Church street school. At the first hearing of the action before Magistrate Kingsford, the case was dismissed. The prosecutors appealed to the County Judge, who gave the following as his decision: "I am of the opinion that any brick pit built within a building without connection with the drains, and used, or intended to be used, as a privy, the construction of which allows the deposit of filth to accumulate and remain in the said pit, and attached even to a ventilating system, which, under conditions likely to arise, creating back draughts, allows the contaminated air or gas to escape therefrom into the building, is prohibited by the by-law. * * * No one is at liberty to construct a privy pit such as is in use in the Church street school." The appeal was, therefore, allowed, and His Honor ordered the defendants to pay $5 and all costs of the action, including the costs of the appeal. The case has now been carried to a higher court.

TRADITION AND MATERIAL IN ARCHITECTURE.*

THAT material is essentially a part of architecture at once marks out that art from others, sculpture in nearest degree resembling it; but painting, music and poetry are almost free of the practical limitations that the use of material implies Architecture is not so ethereal an art as any of these; like these it appeals to the mind of man, but in addition it supplies a bodily want, and this is a dual service attempted by no other. The architect's cognate worker is the clothier whose service to man is the same in kind, differing in degree for use and beauty; architectural style is pretty much fashion writ large.

That mere mass of material should be of account at all in an artistic appreciation of architecture is repugnant to some, still the fact is unquestionable that bulk produces a sense of awe. The Parthenon is now surpassed in size by many a factory, yet even its influence in the expression of majesty was not a little owing to substantial size; in its day it was amongst the biggest of contemporary buildings. True art will recognize this common instinct, and will with least material give the sense of greatest extent. If it be argued that it is not possible to magnify appearances, then, negatively, an artistic aim will be to prevent the belittling that results when features are measured that by association have a certain magnitude attached to them—St. Peter's, for example.

I would direct attention to some of the materials used in building, with the object of showing that, though an essential constituent of architecture, material shares place with another influence, tradition, that is yet more powerful. Mind has influenced matter by a greater degree than some are disposed to admit. If on the one hand we must differentiate architecture from sculpture and painting, by whose canons of criticism it is so often mistakenly judged, on the other hand we must avoid excess in our materialistic belief in the potency of materials recently or yet to be discovered and applied in buildings.

We may well surmise that at the beginning the materials of a country or locality strongly influenced its architecture; but it is not so easy to get direct evidence of the fact, and the day has passed for the calm assumption of certainty as of the methods, not to say motives of the men of old; to gratituously assume, as not so long ago was the custom, that primeval man took Nature in the fields and woods as his tutor in columnar construction, is unwarranted. The resemblance between trunk and column all may see, but not everyone may settle how much is coincidence and how much conscious imitation.

However interesting ethnographically may be the study of man as cave-dweller or erector of tent and hut, for practical purposes we may date the beginning of architecture from when we see evidently that, coincidently with provision for material wants, an elementary desire for beauty has been met in a traditional treatment or style. The earliest of Greek and Indian remains that we have are far removed from the beginning of things architectural, and notwithstanding what evidence may yet come to light, it is hardly probable that we shall ever get much nearer the beginning; but rightly directed research may enable us to predicate with some measure of certainty as to what that beginning was. Though the earliest remains are of stone, they show forms that have such a resemblance to wood construction that from the masonic evidence alone we should be justified in affirming the fact, even without the confirmation of pottery aud painted and carved decoration. I do not suppose there can be any room for doubt that many features in Indian work are clearly limitative or reminiscent of wood construction; the trellis work of stone beams, the corner bracket from columns like a fork of a bough, mortises and tenons, etc. But is it equally clear that the Greek Order is also an immediate survival of previous timber construction? Many are of opinion that it is otherwise—Viollet-le-Duc in his lectures, for example—and maintain the Order to be specifically designed for stone. They bid us note that the Doric abacus is of a size not easy to get in wood; while the derivation of triglyph and mutule from ceiling beam and rafter respectively is negatived by their appearance at the gable ends, where in their alleged prototype they could not have been. Even the shaft, they argue, does not appear to come at first hand from the tree trunk, for the further back we go the stumpier they are and the least like trees; while it is noted that a square prism of stone is most naturally taken from the quarry with its four corners cut off, and these again chamfered give the sixteen-sided column of the earliest Greek type. All this notwithstanding, I thing the Classic order does show a reminiscence of prehistoric wood construction. In the case of the abacus, the timber prototype has entirely been departed from, and it now shows the qualities proper to stone, but in other parts this influence of material on design is absent. Tradition has been more powerful than logical consistency, and wood forms are perpetuated in stone.

It is obvious that big stones are required for lintels; smaller will do for arches. So in Greece the abundance of Pentelic marble has permitted of, if it did not suggest, a trabeated style; but Egypt also employed the lintel, though with the greatest difficulty. She had to hew the hardest of granite and transport it long distances. Why, we wonder, did not the excellent bricks suffice for arches that would have proved hardly less enduring than the granite beam? And in the lintel an arch form has here and there been found, proving, apparently, that a religious sentiment led to the use of the material conceived to be most lasting, while an architectural motive, gratified at the expense of logical treatment, led to the arch form in a lintel. Let three thousand years pass, and in, perhaps, the oldest type of building we have in Scotland—the Round Tower at Brechin, for example—we have large masonry generally, and a large lintel with the arch cut out of it. Opinions may differ as to the origin of the prototype, but there the arch is a notable instance of tradition being more influential than material. Early Romanesque work has generally larger sized masonry than Gothic, yet the same quarries were drawn upon at the different periods, hewing implements and mechanical means of transport all improved, but the later builders' inclination did not go out to Cyclopean work, when it might quite easily have been gratified. Hence, throughout the whole Mediæval period in Britain I question if a stone has been built exceeding a couple of tons in weight. About Oxford I have noticed in places a soft stone in large sizes, but singularly enough the forms cut are plainly those traditionally in vogue when smaller stones were used. Late arch-labels in the

*An abridgement by the author, Mr. Alexander M'Gibbon, of a paper read by him before the Perth Architectural Association, on Friday, November 4, 1898, republished from The Builder.

same way generally keep the traditional section, but are cut out of larger stone than was the earlier practice; they have no joint, that is, at the extrados. We find Gothic at Mont St. Michael, and Classic at Aberdeen, both of granite, but it does not appear that in either case the material had anything to do with the choice of the style.

Wrought-iron in the form of tie-rods influenced the Gothic of Italy. Arches were desired springing from single columns at porches and elsewhere, but the thrust was met not by counteracting flying buttress or inertia of wall, but by tension of metal. This was a novel use of a material till then in construction neglected, but now legitimately, if not quite happily, turned to account, and one might have expected the new mode to have spread and become more general than it did; but after all it takes its place only as a useful aid alike for arches and roofs. Gothic architecture was not revolutionized; the old methods have not been displaced; for one arch to be seen, even to-day, whose thrust is met by tension, a dozen are found sustained by either counter arch or buttress. The eye is apparently better pleased to have it so; old world practice is in its favour, hence the mode endures.

Cast-iron columns and rolled beams in our own day are developments that have undoubtedly influenced architecture. To believe some, indeed, one would think we are now quite emancipated from all past canons of art; but we note that, although most happily we have it in our power nowadays to do much that was hitherto impracticable, still, after all, a substantial proportion of the world's work is done in the old way. No disparagement to the new methods; for architects, whose conservative sympathies incline to stone construction, often best appreciate the existence of metal so used, and it is they, and not engineers, who should give all due regard to the novel material, and who regret to see it masked behind masonry—as, for example, at the Tower Bridge.

Lead is a material that as a covering might have influenced the Gothic roof, and so necessarily the gable—the characteristic Gothic feature, says Ruskin—in a way that it did not. If in Norman times lead was in small plates, in Gothic times, just when roofs were steepest, it was used in strips and rolls. On a pitch of forty-five to sixty degrees slates and tiles hang well, but the "crawl" of lead is excessive; the material calls for a rake anywhere under thirty degrees; called, I may say in vain, for over a couple of centuries, until in the Perpendicular period this sensible pitch of roof was given; in this, as in some other things, the style showing a truthfulness to utilitarian principles and logical construction not met with in the perfected Gothic of France, so unwearyingly eulogised for this very quality. Of course, I am not arguing that the pitch of the roof ought to be lowered to suit cast-lead; architecture overrides such fitness. I only cite as a historical fact that it was not, although the practical logic of the material pointed that way; traditional motive was superior to the material in influence, and Gothic as gloriously inconsistent as ever Classic was.

Timber, I think, we might have expected to have influenced our Scottish buildings more than it has. Of suitable woods we have abundance, and the climate is not inimical. Statistics of the comparative rainfall in Lancashire and our west coast prove this; yet in Lancashire there are noble half-timber manor houses; with us none at all. Why is it that north of the Tweed we have not a single timber church porch, and a timber spire is rare, though these may have existed? Simply, we must believe, I think, that the timber work did not appeal to the Scottish taste, though material in abundance was to be had, in spite of what Dr. Johnson was pleased to believe to the contrary. Zinc and sheet-iron have been employed in America for cornices, a a development on European practice (chiefly French) confined hitherto to large and elaborate hip rolls on roofs, mansard especially. This direct imitation of stone features is alarming, but perhaps only at first. A little reflection will reassure us; it is no new thing in the course of architectural development for an old form to be copied in a new material. We have seen wood copied in stone; stone imitated in sheet iron is not more strange. As in the former case, it will be an affair of time, if ever, before detail is designed appropriate to the new material; but even with its nature and capabilities recognized there will remain a reminiscence of that other material from which it was derived. It is in the noting of such like derivations that much of the interest of archæology consists.

Largely because of the use of a metal frame-work in buildings, terra cotta has come into vogue. It is, of course, nothing more than brickwork of a superior kind, which, instead of being moulded into plain solid blocks, takes the form of pottery; solidity, if required, being given by concrete filled in when building. One obvious possibility about this material is that, coming from a mould, elaborate ornament can be repeated easily and inexpensively. We must, then, in judging it, use another standard than that applicable to carved stone-work. Vermiculation and diaper laboriously cut by the mason often offend by vaunting labour of execution over design; but as turned out from a mould our criticism must alter, and we may welcome abundance of ornament that need not disturb the contour of features, and may give a texture of surface of almost as much value as colour itself. This, of course, should be our treatment of the material; but whether it gets it or whether it will be treated just as stone, time alone can show. It has been noted that in the modelling of terra-cotta, as raised ornament is applied by the fingers to a surface rather than left by cutting from it, as with stone, so the treatment should express itself in the case, say, of a panel, by the ornament projecting. This is, perhaps, carrying the principle to an extreme of nicety, for the material being plastic, the modeller can at will dig out or apply; but I think it very just that in stone cutting this truth in working should be more recognized, for it is always regettable, as misapplied labour, to see small portions of raised work left at the expense of sinking a large surface.

Besides the inherent quality of materials that should condition their employment, there are others imposed by process of manufacture, such as size in bricks, or commercial usage, as the stock sizes of timber and stone, carrying with it variation in prices that cannot be disregarded. These intrinsic conditions may, to a slight extent, modify architecture, though, if motive is assertive enough, these will be overridden; but I can see no particular merit in disregarding such subordinate influences. In one of Dublin's cathedrals are to be seen, I believe, Purbeck shafts that, just as shipped across channel in stock lengths, are built, with bands at intervals, decided not by an architect's designs, but by quarrymen's practice. It is a trivial matter, but I do not think architecture in the grand sense suffers

from it, and to those who know there is an added piquancy. We know that in our ordinary practice stones are delivered at a job of approximate fitness in size for the particular parts they are intended for, so there is considerable affectation in the studied excess of irregularity in door and window quoins sometimes seen; weak in construction, it disregards the workman's practice. It will give a craftsman's interest without the architect's influence in any way being impaired, to let local practice assert itself in things immaterial.

Let this, then, suffice to answer the query. Has the architecture of the past been influenced most by material or tradition—the motive of the designer? Assuredly by the latter. And that said, are we prepared to go further and forecast in the future, say, which of these will be the potential influence in days to come? A question not strictly within the limits of a practical paper, yet not wholly idle; for as we realize the greatness of the future so shall we be inclined to see the dignity of the present, out of which that future must proceed. To me it seems that only in the experience of the past have we any assurance for the future, and if we are inclined to think of the maxim, "The thing that hath been is that which shall be," as derogatory to present day life and progress, let us reflect that the part of architecture is something very noble, of an antiquity greater far than that of music and painting, the popular arts of to-day. Hence our data, gathered from a wide source, permit of an augury that one might not attempt in these arts. "Forty centuries look down on us from the Pyramids," while music, which in much is analogous to architecture, and has been delighted in by man since its creation as an art with formulated canon, is of comparatively recent date. Seven centuries ago harmony as now understood was not, while the best of the musical instruments are the inventions of the last two. Landscape painting, with its developments of perspective aerial and linear, of recent date. Sculpture resembles architecture, not only in mass, but in age; its principles and practice are as old as civilization. The same may be said of poetry; so it is not to be wondered at that these, with architecture, fail to show the modern development that music and painting exhibit.

This antiquity, then, of architectural practice gives data for a forecast of its future. Of course, architecture has not been a thing of evolution and broadening precedent only. An intelligent review shows that besides logical advance, with increasing utilitarian needs and variety of materials there has never ceased to exist a sentimental influence, impalpable but potential, viz., traditional motive—which very often has expressed itself in tenacious retention of old forms for the sake of associations connected with them, material or religious. And hence have arisen all these delightful inconsistencies in the use of materials that we have discussed; the prejudices that influence a national choice of lintel or arch style, Classic or Gothic, that no one can suppose ever came out because of the architect class decreeing the superior merit of one or the other, even had the architects themselves been quite beyond the influence of the current taste. And so architecture is seen to be a history of human progress written in stone. Surely national peculiarities are worth preserving, even provincialism in due measure; it is a spurious altruism that would replace these by a lifeless cosmopolitanism. Timber, as we have seen, is quite available in Scotland, but just because of the historical fact that heretofore it has not obtained favor, perhaps we do well to preserve the character of our architecture as we find it. We do not condemn half timber work if we elect to use stone, for there is a difference between our retention of old forms and that of former times; this, namely, that our conservatism is self-conscious. Then it was that, knowing no other way and convinced that their father's methods were best, a traditional method was followed; while we, not even by implication, affirm that other forms are less worthy, where we retain those indigenous to our land, or specially associated with our race. Vandalism was the characteristic evidence of life in all previous periods; nowadays we rightly taboo that spirit, for we can exercise the right of liberty in choice of our models without destroying those we do not follow. Employing past forms and archaic materials does not imply that we are wilfully blind to the excellence of modern; it but indicates the cultivation of a sentiment that adds poetry to our too matter-of-fact day. Modern needs, comforts and conveniences may be depended on to demand and get full attention, but a fostering care is required for the beauty that should accompany these, and this will often take the form of ingeniously preserving the historical continuity of traditional forms.

The phonetic power of architecture is very limited; beyond the expression of majesty, richness and beauty, I know of none a building is capable of. The first is effected by actual bulk, the second by repetition of parts, the third by refinement of form. Beyond these it is by association of ideas merely that certain styles are popularly apportioned to certain types of building, to the church, the theatre, the town hall, the family dwelling, &c.

Now, these three emotions are excited independently of particular materials. Thus, much of the Italian Renaissance is of brick covered with stucco, simulating stone construction; and, regret as we may the unsubstantiality of the meaner materials, the architectural form is there and gives us pleasure; that pleasure would, of course, be heightened by the presence of the real rather than the make-believe. Still, intellectually, it is better to have, say, Palladio in stucco than not at all. Whether granite or stucco, in mass there is produced an emotion of awe. Repetition of parts expresses richness; its equivalent in poetry is rhyme. That may be allied with doggerel, but is none the less a component part of noblest verse. So in a structure the repeated feature may be poor, though not necessarily, but simply because with its repetition a sense of richness results. This principle is best exemplified in Indian work, but a colonnade or arcade are cases in point; and to come to details, note the dentil course in a cornice or a balustrade. Of the Greek triglyph, you remember Ruskin has asked if any one ever found pleasure in it; but even if unlovely in itself, repeated, it tulfils a purpose. Repetition of parts and symmetry are methods by which an architectural effect is produced, and that quite irrespective of materials. And clearly, abstract beauty of form is in no degree dependent on material.

So we may confidently predict of all coming architecture that whatever be the material employed, not merely the principles of the past, but as these were practised—the actual form—will be retained. Novel materials may emerge, but in the main the old will be preferred. There will be cycles of fashion in revivals of past styles, but withal there will result an accretion of real worth, so that it will not be possible for future cognoscenti to be misled in distinguishing the chronology of these successive revivals, for each will have acquired insensibly a character peculiarly its own. Color indeed may perhaps be more considered than it has been, for chemistry or commerce may bring to us colored material hitherto denied us; but this will never revolutionize architecture. The best correction of the mistaken notion that the coming years will see new materials, and hence a new architecture, is a reference to history; can any one conceive of greater social changes than the past has shown, or wider variety in material than timber, stone metal and slate?

STUDENTS' DEPARTMENT.

STUDENTS' AND DRAUGHTSMEN'S COMPETITION.

We regret to announce that only one photograph was submitted in the Students' and Draughtsmen's Competition for photographs of residences, announced in this column recently. Under these circumstances we feel justified in not awarding the prizes.

The students and draughtsmen of to-day appear to lack the enthusiasm which characterized the young men of the profession in Canada five or six years ago. We would be gratified if some of them would tell us the reason for this seeming lack of interest in matters which might be expected to arouse the attention of ambitious students.

If the terms of our recent competitions have in any way been unsatisfactory, we shall be pleased to be informed in what respect they failed to meet the requirements. We, in common with many of the leading architects, are at a loss to account for the apparent apathy of Canadian architectural students with regard to matters in which students of other countries evince the most active interest. Will some spokesman arise from the ranks of the students and draughtsmen and tell us what is the matter?

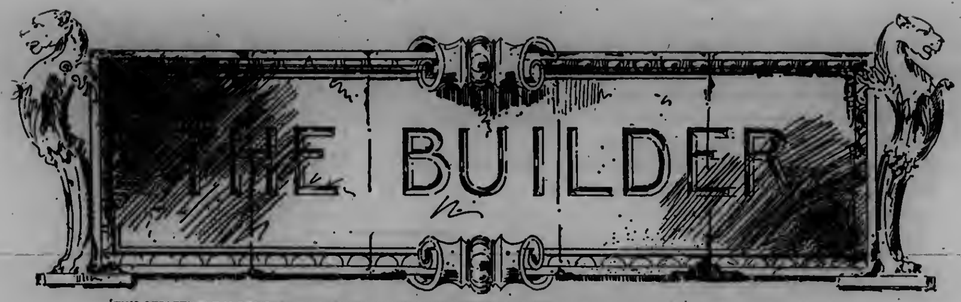
THE PARTHENON.

The Parthenon has gathered unto itself all the best points of Greek architecture; it has studied harmony of proportions, delicacy of feeling in optical corrections, exquisite taste in selection of mouldings, colored ornaments and unrivalled sculpture. Take away the sculpture and some accidental grace was gone; but the building in all its transcendent beauty would remain as single and specious as a statue. Take away the sculpture and its air of sublimity would remain in the sheer weight and vigor of its masses and in the colossal scale of its architectural forms; its air of grace would remain in the modulated harmony and exquisite perfectness of its related parts; its air of intellectuality would remain in the austere majesty of its conception; its air of religious awe would remain in the mystery and poetry that its author communicated to his work by means that he knew so well how to wield. Think of the expressiveness of the structure as the broad rays of rising or setting sun beat aslant the clerestory in the roof upon massive columns or undivided weight of solid wall, and threw the unlit parts into gloomy shade. Think of the small scale of the sculptures—the noble frieze, for instance, is but 3 feet 4 inches deep—and compare this with the impressiveness of mighty mouldings whose abacus is 6 feet 5 inches square and diameter 5 feet at the top. It is the glory of a great building that it is one grand indivisible whole; take away the sculpture and some accidental grace is gone, some emphasis of parts is lost; but the primary quality, the central sweetness of the thing, remains. On the other hand, if a structure retains its expression, even though you remove its accessory of figure sculpture, it is different with the sculpture that is removed. The figures formed part of the very masonry of the structure. They emphasized its parts. The glory that they had was a communicated glory. The music that they made was only a part of a grand chorus, a share in the pervading harmony of the fabric that the master musician had blended with the melody and rhythm of the rest of the related parts. The music was not theirs, for it would go on still in the fabric, and with little perceptible difference, when the figures were gone. But removal makes all the difference to the figures; their inherent loveliness remains, but they become in a manner dumb, and remove them from the pediment or pedestal or niche to which they are allied and they wear an orphaned appearance like poor casuals without a home.

AUGUSTUS PUGIN THE ELDER.

Augustus Pugin was an emigre—one of those virtuous, blameless, painstaking Frenchmen whom the revolution drove into England, and who, taking kindly to the sober land of his adoption, like so many of his countrymen, pursued thereafter a life of diligent and worthy industry, in utter contrast to the hideous tumult which had cast him forth. It would be an interesting inquiry to discover how many such, so utterly unpolitical that the fact of their having been driven to these shores by such a whirlwind of social agitation is almost unbelievable, have stimulated and afforded new developments to English industry and laboriousness. Pugin, by dint of a faculty of drawing not much cultivated or remarkable, fell in his penniless and friendless estate into the employment of Nash, the architect, and by degrees became himself a theoretical architect of much eminence and influence, laying the foundation in his careful practical works and in the thorough training of his pupils for all that has been since accomplished in Gothic architecture. It was the age of the Brighton Pavilion and other such monstrous follies in which with souvenirs of Normandy in his heart the quick-eyed Frenchman, with his lively pencil and perception of awakening public interest, took up the vanguard in the new movement. He made the noble remains of former ages familiar to the eye and clear to the mind of the nation, which stirred by many influences, and in the flush of a new outbust of national genius and splendor, began to be doubtful of its own tame mediocrity in point of art. When public taste has come to the length of bursting out into insane bulbs and pinnacles by way of relief from the dead flat of former dulness, such an oracle close at hand is invaluable. The French draughtsman who loved his work, and had no other object in life than its accomplishment, filled his office with pupils to whom he opened a new and fascinating world. Cathedrals and castles, not of stucco, all noble, real, solemn, rose out of the darkness around the fortunate lads who were to reproduce and emulate what they saw. Their master himself reproduced only upon paper, in books that stimulated the general curiosity and helped to mend the vitiated taste which had exhausted itself upon pediments and cornices. They went into France and over England, sketching everywhere, making "examples" of the half-mouldering fragments which otherwise would have been lost to the world, and learning by what simple, splendid constructive art edifices which look like creations grew into being. Within the household where the Frenchman trained his pupils into all the individualities of Christian architecture a kind of Protestant conventual rule existed. under his strong-minded English wife.

Not infrequently the final cleaning up of painting involves the scrubbing of bare woodwork. In such a case use borax freely, adding it to clean water. In acts as a disinfectant, assists the actual cleaning operations, and prevents the breeding of insects.



[THIS DEPARTMENT IS DESIGNED TO FURNISH INFORMATION SUITED TO THE REQUIREMENTS OF THE BUILDING TRADES. READERS ARE INVITED TO ASSIST IN MAKING IT AS HELPFUL AS POSSIBLE BY CONTRIBUTING OF THEIR EXPERIENCE, AND BY ASKING FOR PARTICULAR INFORMATION WHICH THEY MAY AT ANY TIME REQUIRE.]

On Slate Roofs.

If slates are laid on a boarded roof the boards should be covered with a waterproof bitumenized felting, overlapping on the incline of the roof. If when slats or battens, a sheet wire netting might be stretched from slat to slat in order to keep the felt from sagging, and the slates laid with the proper tilt to make the tails lie close. To keep out draughts, as well as a special precaution against leakage occurring on exposed sites from driving rain or melting snow, the slates are often pointed with hair mortar on the inside, or "torched" as it is termed, or they may be shouldered or bedded for about two inches at their heads in hair mortar, generally mixed with coal ashes, which have been sifted and washed, to give a good slate color, and this method is more effectual than mere pointing, as it does not get loose nor drop out, while it tends to keep the tails or feet of the slates down tight. Sometimes the slates are rendered on the undersides with good hair mortar, both to keep out the weather and maintain a more equable temperature within. If the slates are already laid and the roof leaks, pointing must be resorted to as suggested, but there is a cement for pointing which has been in successful operation in this country and England for a long time, and it is superior to hair mortar. It is made as follows: Take equal parts of whiting and dry sand, add 25 per cent. of litharge, make into the consistency of putty with linseed oil. Use just enough sifted and washed coal ashes, in addition, to give the mixture a good slate color. Apply where required while soft. It will not crack when cold, nor melt like coal tar and asphalt with the heat of the sun. Slate makes a superior roof, but is heavy and costly, and requires great care in laying on the roof, but when once done, it is good for several generations.

Builders' Exchanges.

Workmen by their united action, often accomplish many things favorable to themselves, that never could have been done without organization. The occasional misuse of the power attained by organization does not alter the fact that through unity of purpose the greatest good for the greatest number can often be accomplished, and in this sense, when employers of skilful and other labor in the building trades are associated together they can do much, by combined effort on reasonable lines, towards warding off the labor disturbances that seem particularly to afflict the building trades. Under existing circumstances, labor organizations have no headquarters to which to submit their grievances, and the individual contractor does not, as a rule, feel justified in conceding to his dissatisfied workman, something he imagines would be unjust to himself and fellow contractors. If there was a recognized authority—a Builder's Exchange—in any city or town where dissatisfaction existed between the employers and employed the two parties could easily be brought together, and by talking their differences over and "reasoning together," a rupture might be avoided "and peace with honor" secured by both parties. The peculiar condition of the building trades from a business point of view is that nearly all contracts are secured by competition, and this makes united action on the part of employers difficult to obtain, for the reason that there are always certain builders who will not identify themselves with any movement they may fancy will place their business in temporary jeopardy. As a rule, however, the majority of contractors associate themselves with an Exchange when once it is established, knowing that to become members benefits of many kinds are sure to result, but they do not care to take an active part in its establishment, partly from modesty and partly because they imagine it will make serious inroads on their time—and their purses. As a matter of fact, it need take but little of either if proper methods are employed.

Remodelling Old Buildings.

It is quite a difficult undertaking to re-model and modernize an old building, particularly if it is expected that much of the old building is to be left untouched. Heroic measures are generally the best to adopt in work of this kind, and designing the new building to a large extent regardless of the old one, keeping just a few things in view only. If the old building is large enough on the plan to cover the requirements, the task is generally more difficult, as additions can always be rendered so that defects in old structure may nearly always be hidden, and windows and doors and gables may be so distributed in the new part as to subordinate a great portion of the old work to it. If the floors and floor timbers are sound, and the building is not to be raised on its foundations, the task will be made much easier than if new floors were required, or if the building had to be raised. If a new lay-out of rooms is necessary, this will be governed largely by the position of the stairways and well-holes, and by the position of the partition or partitions that support the inner ends of the floor joists. Moving or disturbing the partitions that carry one end of the joists should be avoided if possible, and the new lay-out should be so designed that the old well-hole remains undisturbed. Where this latter cannot be avoided, there should be new joists inserted, and the short joists and trimmers forming the well should be taken out. This is important, as carrying short joists from trimmer to wall is inadmissable, as it would leave the floor too weak to resist every strain it might be

subjected to. If the house to be remodelled is of brick, due regard in the new lay-out must be had to position of windows and outside doors, as one of the worst features of renovation is the removal of windows or doors and bricking-up the openings caused thereby. Windows or doors may be enlarged without disfiguring the brickwork if done carefully, but even then, if there are stone lintels or gauged niches over them, the enlargement should only be made in their length. In wooden buildings the moving of windows or doors does not matter so much, but when it can be avoided it is always better to do so. Generally, the remodelling can be done in the sashes, unless, perhaps, it may be desirable to insert a triplet or a twin window where only a single window was before. In a frame building this will be easy enough, but in a brick building it will be necessary to take into consideration the effect the change will have on the wall above. Perhaps the most troublesome part of the whole work will be in dealing with the roof. If the whole is to be new there will not be much trouble, put if additions are to be put to it, or dormers or skylights put in it to light up the attic, the practical builder may find some difficulty in arranging them so as to accomplish the practical purpose and at the same time add to the appearance of the building. When a building is to be remodelled, no work should be commenced until everything has been considered and the scheme for the renovation has been completed in every particular. Of course, no hard and fast rules for this kind of work can be formulated, as each particular building to be remodelled will require a treatment peculiar to itself Architects generally agree that it taxes their skill and ingenuity much more to remodel a house and give satisfaction than it does to design and build a new house out of whole cloth, so to speak.

Safety Vaults.

A WELL-BUILT vault with a good safe of modern make may be considered fairly safe so far as ordinary fires are concerned. Late occurrences go to show that the best constructed safes and vaults afford but little protection against the raids of scientific burglars. However, as a place to deposit valuables and to reasonably protect them against the ravages of fire, the modern vault with its usual accessories seems to be the best device yet invented. The construction of a thorough fireproof vault entails a considerable amount of care and expense, and experience has proven that the only material that can be relied on to resist the heat of a burning building is well burned brick laid on a solid foundation of honest concrete and stone, the latter to be below the ground line. All vault walls should be double, with an air space of from three to six inches between the walls, and the two walls should be bonded or tied together at close intervals with fire-clay, brick tiles or with copper strips one-fourth of an inch thick and from one to one and one-half inches wide. If neither of these can be obtained, iron strips may be substituted for binders, though iron is not the best material to use in a vault. The walls should not be less than nine inches thick, but it is much better to have the inner wall nine inches and the outer wall fourteen inches thick. The object of having the outer wall the thickest is because in case of fire, the thicker wall would resist the longest, and its greater strength would prevent its being broken through by falling debris, and before a fire could make its way through fourteen inches of solid brick, its force would be well spent and the inner wall would easily resist it. The outer wall should be laid up with Portland cement mortar—not to make it more fire-resisting, but to make the wall stronger so that falling timbers or walls would not destroy it in their descent. The face of the walls in the air spaces should be "parged" or rendered with mortar containing about 25 per cent. of Portland cement. This will add greatly to the fire-resisting quality of the walls. A plain semi-circular arch should be thrown over the vault from each wall. This, of course, would make two arches, one nine inches thick covering the nine inch wall, and the outer one fourteen inches thick, springing from the face of the outside wall. These arches should be carefully constructed and laid up with cement mortar, and all the joints well filled in. The inside arch should be turned over a centre, and when completed the outer or top arch may be turned over a sand bed laid on the lower arch to the thickness of the air space. When the arch is completed, the sand may be removed, though this may not be essential. The tympanum, or end of the arches, may be built up after the arches are turned, but they should not be connected with the arches in such a manner as to preclude any shrinkage of the arches, as that would cause some displacement that might prove dangerous. The whole of the brickwork in the vault should be left exposed for at least thirty days, and then a careful "pointing" process should be gone over, stopping up every joint or crack. The inside of the vault—and the outside too, for that matter—should be rendered on the brick walls, and the mortar used for the first coat should contain a fair proportion of Portland cement. A well built vault with semicircular arches should require no binding rods to support it, as it will be able to stand, without damage, any ordinary stress that it may be subjected to. However, as a matter of precaution, it may be as well to tie the walls together by iron rods, just below the spring of the arches. These rods may be from one to one and one-half inches in diameter, but in no case should they go through the outer walls. Four rods are usually sufficient for ordinary-sized vaults, two on each side, crossing at right angles to each other. They should be laid in the wall as the work progresses and should have large flat washers on their ends to hug the outside face of the wall. After the brickwork is up to the spring of the arch, the rods may be tightened up so that the washers hug the wall tight. Provision must be made for ventilating the vault, and this should be so devised that neither the inlet or outlet should be so exposed that fire could creep in if the building was in flames. When it can be done, the cold air should be drawn from the outside and from a point some distance from the vault. This could be managed by the use of metal pipes or drain tile, so laid as to carry the air from the outside of the building to the vault, where it might be admitted on a line with the lower courses of the brickwork, or through the concrete or other floor. The outlet should be well up in the vault, and if possible should lead to flue in one of the chimneys. If there is no chimney near at hand, and the building is in course of construction, a flue might be built in the wall purposely for the outlet. If this cannot be done, a system of piping, either through the floors or exposed, should be devised leading to the outside, so that a clear current of air may circulate in the vault at all times. It is not wise to have the inlet or the outlet for air inside the building in which the vault is situated.

RELATION BETWEEN ARCHITECT AND HEATING ENGINEER.*

By T. N. Thomson.

It is unfortunate for the advancement of heating and ventilating interests that so little consideration is given to the scheme of installation while the building is in the embryonic condition. There is so much "hurly-burly" in the current methods of business that the bulk of our wisdom is included in the "backsight" instead of in the "foresight" lens of discernment, and until clear and well defined lines of procedure are adopted in the offices of both architects and engineers, little progress can be hoped for.

Example.—Broker Martineau calls on architect "Sector" with the information that he has purchased a lot and wants him to get out the drawings for a four-storey residence right away; in fact, a friend of his is ready to start excavating as soon as the cellar plan is out, which must be within ten days.

The architect naturally maintains that it is poor policy to talk of building cellar walls before he has thoroughly studied the requirements of the building and had sufficient time to complete the structural plans in detail, but his client feels that immediate progress must be made, and will listen to no explanations. As a persuader, he hints that architect Todhunter is very anxious to do the work, and unless Mr. Sector can see his way to go right ahead he will have to see the other fellow. The client's patronage is valuable, and he must be humored, so the result is that Mr. Sector immediately commences preliminary studies and submits them to his chief draughtsman with instructions to push them along, as Mr. Martineau will call in three days to examine them. Before the broker and his wife, however, have made up their minds as to the many details of arrangement which they wish incorporated in their residence, it is found that thirty days have elapsed and the architect is still goaded by his impatient client to make a start. The office force is set to work preparing the working drawings, and the chief draughtsman, having decided on the structural requirements of the design, now turns his attention to the location and size of the smoke and heating flues, etc., provision for which must be made in the walls. He therefore consults with his superior on the proposed system of heating, but finds that the owner has not yet decided upon a system. The work must be pushed, however, and the very important matters of heating and ventilation are entirely neglected until the building is under cover. Up to this time the only provision that has been made for the heating system is a chimney flue located somewhere—generally anywhere—and it will be a miracle if this flue is not too small.

The reason why this state of affairs exists, possibly, is that the owner does not know what kind of a heating system he wants, and consequently, his architect has been working in the dark; it is more probable, however, that the energies of the architectural force have been concentrated on the construction of the building, and the heating system has, therefore, been overlooked. The owner is now notified by the architect that a decision must be made on the system of heating and the contract must be let and the work started immediately, otherwise the plastering will be delayed. After many consultations between architect and owner, the latter decides that, as the design of his residence has attracted so much attention and has been so favorably commented upon, he is justified in having the very latest and most approved system of heating and ventilation installed in the building, and Mr. Sector is instructed to submit schemes for accomplishing the same, with estimates of cost.

The architect immediately calls in a few expert heating and ventilating engineers and explains to them the characteristics of the structure and certain conditions which he is desirous of having complied with. He also gives each engineer a set of blue prints and general instructions.

Of course each engineer decides upon an indirect steam or an indirect hot water system, but when he takes a general survey of the now half-finished building the difficulties to be surmounted are so pronounced, and the expense of such an installation is so great, that he reluctantly feels like recommending the old direct-radiation method all over. It is just the old story—no provision made for anything but the chimney.

After an enormous amount of worry and scheming each engineer submits two sets of plans and specifications—one set is for direct radiation and the other for indirect radiation with the necessary outlet or vent flues and probably an aspirating stack.

The indirect plans are submitted first, and the architect is simply stunned. His practiced eye sees at a glance that this vent stack and that flue boxing, along with many other projecting monstrosities, will ruin the internal effect of the structure. The basement will be like a factory, and, in fact, the entire building will become a "hotch-potch" of pipes, flues and boxings. Something must be done so that a reasonable degree of character and style will remain in the internal treatment. Engineer and architect now consult and decide upon a "give-and-take" plan. The architect is willing to cut out here and build up a little there in order to conceal certain flues. He changes the plans somewhat to get in a central vent stack, and puts in a few more open fireplaces for the sake of ventilation. He also agrees to build an underground duct, and brick in the indirects, etc., all for appearance and general utility's sake. The engineer, on the other hand, cuts out some indirects and replaces them with direct radiation, because it would weaken walls or beams too much if the proposed flues were all run through, and so the thing goes until a fairly good arrangement is mapped out on the "trestle board." But see what it will cost to make the changes in the building; compare it with the very simple, economical and unobtrusive system that could have been devised if architect and engineer had but worked together on the first lay-out of the plans, before the construction was commenced.

This is no fable—it is an every-day occurrence, and almost every engineer can testify to it. Why is it that some of the very finest and most costly buildings in the country to-day are defaced internally by steam pipes running here, there and everywhere? it is simply because no provision was made for a better arrangement in the working drawings, and before the building was commenced.

Why is it that the basements of most large buildings look like factories? Just because the engineer came on the scene too late to have it otherwise.

Why is it that the basement of a building is not usually finished in a half-decent manner? Just because there is a general impression among architects and owners that this part of the building, at least, must be sacrificed to the several engineering contrivances now in use in all modern buildings.

Architects are not blind to this fact, and nobody knows that better than we do; they all prefer consultation with the engineers before the working drawings are made, because they know how much can be saved and how superior the results will be when all installations are carefully considered in detail and accurately mapped out before the cellar walls are built. But this treatment of a building is seldom resorted to except by a few of the leading architects.

* Abstract of paper read before the Society of Heating and Ventilating Engineers, New York.

FACE-BONDING.

Clarence A. Martin, in the American Architect, gives some highly valuable pointers to masons and builders on the face-bonding of broken ashlar work. He says :

If one may judge anything from architects' drawings and from illustrations published in some of our best text-books on the subject of masonry construction, there is much need for observation on the part of those called upon to make or accept such drawings. The word "observation" is used advisedly, for certainly few architects would ever allow face-walls to be bonded as many allow them to be shown on drawings ; and it would be an ignorant inspector indeed who would pass such work as is used to illustrate the bonding of broken or random ashlar in many of our best works on masonry construction. That we have so much really good rubble and ashlar work in this country is more to the credit of the workmen and the superintendents than to that of the men that make the drawing. However, the purpose of this article is not so much to find fault as to offer a few suggestions that may be of use in drawing, building and inspecting certain kinds of stone walls.

In speaking of bonding here, reference is made only to the bonding of the face-stones with one another and not to the bond in the thickness of the wall, though the latter, of course, is not to be neglected a sa measure of good construction. The bonding of a rubble wall offers few difficulties ordinarily, the principal requirements being to keep beds as nearly horizontal as possible and to see that vertical joints are well broken and not too long. In coursed work the bonding is so simple as practically to care for itself ; but it is with broken or random ashlar that the difficulty occurs, and the following suggestions, which have been gradually formulated from a considerable experience as a superintendent, from hints dropped by workmen, and from careful observation of executed work, both good and bad, are offered as a guide for the proper face-bonding of this kind of masonry.

FIRST.—All stones should be perfectly rectangular, no re-entrant angles being allowed, as such re-entrant angles are never cut except to save a stone that has been damaged by having a corner knocked off and are, therefore, prima facie evidence of patchwork.

SECOND.—The horizontal dimension of a stone should always be greater than the vertical dimension, except in the case of quoins, where it is sometimes, though not always, permissible to make the short end less than the vertical height.

THIRD.—No stone should be superimposed directly upon another stone of exactly the same length, thus bringing the end joints of both in the same vertical lines, except in the case of comparatively narrow piers, where this may be necessary to avoid the appearance of coursed work.

FOURTH.—Stones should not be so laid that four corners come together at a single point.

FIFTH.—The number of stones abutting upon a single vertical joint (counting stones on both sides of the joint) should usually be three or four and should never exceed five ; and the number of stones abutting upon a single horizontal joint should never exceed seven.

Broken range ashlar is exactly the same as broken (or random) ashlar, except that it is laid with numerous long horizontal joints. Aside from this it should be governed by the same rules that govern the laying of broken ashlar.

MORTAR IN MASONRY.

MORTAR plays a very important part in all except dry masonry and especially in concrete and the inferior forms of stonework, says Mr. Geo. S. Morrison in a paper on this subject. The simplest form of mortar is a well worked clay, such as adobes are laid up in, and with which the brick chimneys of many of the older farm-houses in our country were formerly built ; but the use of clay has practically gone by except in furnaces and ovens where the heat-resisting capacity of fire clay is more important than the superior strength of a good mortar.

Mortars are generally formed of lime or cement and sand. A lime mortar does not set but hardens slowly. A cement mortar sets quickly and then continues to harden. The hardening of the lime mortar is a slow chemical action between the lime and other elements ; the best results are obtained by mixing the mortar some weeks before it is used and not subjecting it to any great strain till a considerable time after it is laid. The action of cement is different ; the cement itself contains all the elements necessary to the setting and hardening ; a briquette of pure cement will set harder and be stronger than a briquette containing even a small portion of sand. The function of sand in a cement mortar is simply that of a dilutant and is precisely similar to that of broken stone or coarse gravel in concrete. In a cement mortar there should be enough cement to fill all voids between the grains of sand, which implies a coating of the entire surface of every grain, and enough more than this to provide for the contingency of imperfect mixing. The more perfect the mixture the less the amount of cement that will be required, and the finer the cement is ground the less cement it will take to coat every particle of sand.

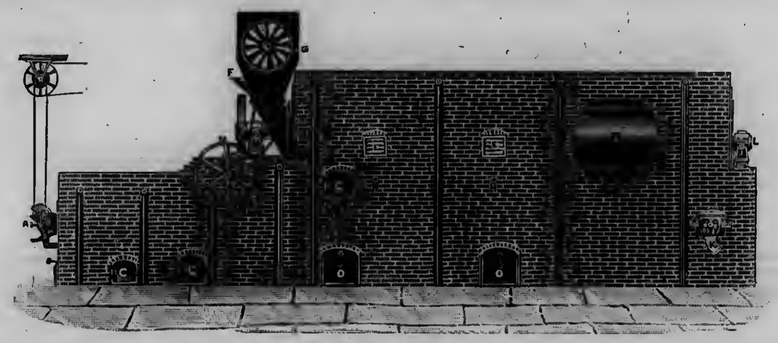
In both lime mortar and cement mortar the best results are due to work ; the more complete the incorporation of the ingredients the better the mortar will be. In lime mortar, which hardens slowly, time need not be considered, and this incorporation can be done slowly. In cement mortar where a set takes place early it is important that too much time should not be spent in mixing. In the alluvial deposits of the Ganges is found a kind of limestone of irregular shape known as kunker ; the Hindoos make a mortar of kunker, lime and brick dust which becomes as hard as Portland cement ; the piers of the great bridge across the Ganges at Benares are laid in this ; its excellence is due to work. A similar excellence is found in all their mortars ; when the lime has been slacked they grind it in a hand mill, then they grind the sand in a similar mill and then they grind the lime and sand together, all of this work being done by women ; the mixture is then wet and ground in a mortar mill with bullocks and when it is used it is pounded for hours. They will take this mortar, plaster a wall, pound it and rub it down and the final result of their patient work is a plastered wall, with a polished surface as smooth as that of procelain, which will stand the weather of their frostless climate for more than a century. The secret of good mortar is work ; in India, where labor is hardly worth 5 cents a day, this can be done by hand ; in this country we cannot afford it ; it is cheaper to use the most costly cements, but even cement mortars are better if thoroughly worked, and I hope to see the time when machine mortar mixers are as common on masonry walls as power riveters are now in bridge shops.

MANUFACTURES AND MATERIALS

THE CUMMER DRYING APPARATUS.

The F. D. Cummer & Son Co., of Cleveland, Ohio, has made the subject of mechanically drying different materials its sole study for ten years. The Cummer Company manufactures two styles of rotary dryers, and each style in eight different sizes. Each dryer is sold accompanied by a guarantee.

The accompanying cut shows a side elevation of the Cummer style 'F' dryer. The machine is used for drying materials that will not support high temperatures. This dryer (which consists of a revolving cylinder of special design, through which the material being dried passes) is arranged so that direct heat is employed, mingled with large volumes of pure air. Absolute control is had over the temperatures to which the material being dried is subjected, in its different stages of dryness. No steam is used, and the drying is all done mechanically. The dry product is delivered at a low temperature and without injury. With this



THE CUMMER DRYING APPARATUS.

dryer, as high as twelve pounds of water are being evaporated per pound of combustible consumed. Soft black coal is the fuel used, and perfect combustion is obtained. The firing is all done mechanically. The whitest of materials are being dried by the Cummer dryers without any discoloration or injury.

The style 'Salamander' dryer resembles the style 'F', but is designed for drying materials that are not easily injured, such as clay, rock, phosphate, sand, marl, infusorial earth, *etc. (*Ores of all kinds.)

The Cummer Direct Heat Tunnel System is most efficient for drying brick, terra cotta, cement briquettes and similar products. Like the other dryers made by this company, it is a great economizer of space, fuel and labor. No steam pipes or boilers are required in connection with this system.

The F. D. Cummer & Son Co. have dryers in operation in all parts of the world (many in Canada), drying different materials, and will, upon application at its Cleveland office, 413 The Arcade, be glad to arrange for any one interested to see a dryer working.

The National Brick Manufacturers Association of the United States at their recent convention recommended the adoption of standard sizes for brick. The size adopted for common brick was 8¼ x 2¼ inches, and for pressed brick, 8⅜ x 4 x 2⅜ inches. The association also adopted, as a standard size of Roman brick, 12 x 4 x 1½ inches, and for a Roman brick, 12 x 4 x 2⅜ inches.

SLATE IN CANADA.

The slate quarried in Canada comes chiefly from the Cambrian rocks in Quebec, although agillites of various colours are known to exist in other parts of the Dominion. British Columbia has had two companies operating quarries by horse and hand power in recent years ; one at Nanaimo, in Vancouver, and one at New Westminster. In Quebec at one time there were three concerns working quarries in Richmond County ; one at New Rockland and two at Richmond, which produced principally roofing slates. In recent years, however, only one large concern has supported the industry, says the Engineering and Mining Journal.

One of the reasons why Canadian production has been small is because slate can be imported very cheaply from the Vermont region in the United States, notwithstanding the duty.

During the years 1894 to 1898, the total production of slate in Canada was $271,411 ; the imports, $119,366 ; the exports, $13,097, and the approximate consumption $377,680.

To encourage the home industry the Canadian government has imposed a duty of 25 per cent. on all importations of roofing slate (not exceeding 75c. per square), school slates and pencils, and 30 per cent. on mantels and other manufactures of slate. Notwithstanding this tariff, however, the domestic output has diminished 46 per cent. during the past five years and the consumption has fallen off nearly as much. On the other hand, a small export trade was built up, but in the last two years little or nothing has been done in this line.

The total production of slate in Quebec in 1898 was 3432 short tons, valued at $37,374, as against 5208 tons, valued at $37,600 in 1897. The New Rockland Slate Company is the only one working slate quarries in Quebec. The company opened its property 35 years ago, and in 1898 it employed 85 men regularly ; 50 in the quarry and 35 in the shops for preparing the slate for market. The average yearly output of roofing slate is used in Ontario. The National Slate Company, a small concern, abandoned its quarry in 1898, leaving the New Rockland Slate Company the only one in the field.

Of the total imports into Canada in 1898 the United States furnished $21,762, or 87 per cent.; Germany, $2,573, or 10 per cent.; Great Britain, $362, or 2 per cent., and China and France the balance. The United States shipments consisted of 1150 squares of roofing slate, valued at $3475, or $2.30 per square ; 302,744 pieces of school slates, worth $10,334 ; mantels, valued

at $544 ; pencils, $447, and all other manufactures of slate, $6952. In comparison with previous years, the imports from the United States show wide fluctuations, more particularly in roofing slate. In 1894 the total imports were 3067 squares of roofing slate, valued at $12,568 ; in 1895 they dropped to 1470 squares, valued $5276, but in 1896 the imports rose to 2891 squares, valued at $9948. On the other hand, the imports of school slates have grown from 140,139 pieces, valued at $4307, in 1894, to 302,744 pieces, valued at $10,334, in 1898.

The small imports from Germany in 1898 included no roofing slate, but a small quantity of school slates. Little or no roofing slate has been imported from Great Britain for a number of years past.

The imports from China in 1898 were 30 squares of roofing slate, valued at $102—noticeable only as coming from an unusual source.

The roofing slate imported went mostly to Ontario and Quebec ; the school slates to the same provinces ; the mantels to Nova Scotia, Manitoba and New Brunswick ; pencils to Ontario and Quebec, and other manufactures of slate principally to the same provinces.

Branch Office of the CANADIAN ARCHITECT AND BUILDER,
New York Life Building, Montreal.

JUNE 15, 1889.

OTTAWA CONTRACTORS' ASSOCIATION.

An understanding is reported to have been reached between the members of the Ottawa contractors' association and the architects of that city, under which the latter consent to invite tenders only from members of the local guild of contractors.

BUILDING REGULATIONS.

The city Surveyor is directing the attention of contractors to section 20 of By-law 48, which provides: No person shall, without having first obtained a written permission from the City Surveyor, dig, remove or carry away (or cause the same to be done), any sod, stone, earth, sand or gravel from any street, alley or public ground in this city, under the penalty hereinafter provided.

THE RENAISSANCE CLUB.

The water color class have their meeting every Saturday night. These meetings will be continued until the 24th inst., when they will cease until the end of September. About a dozen of the members recently took a trip to Lachine and further up the Lake, taking sketches on the way. Although the meetings and lectures will end in two weeks, the members will find the club rooms open as usual.

COUNCIL OF ARTS AND MANUFACTURES.

The announcement of results of the examinations and the distribution of prizes in connection with the classes of the above association, took place on Thursday last at the Monument National ; but lack of space prevents more than brief mention in this number.

The officers elected for the ensuing year are:— President, Thos. Gauthier; Vice President, Cyrille Duquette, Quebec ; Secretary, S. Sylvestre, Quebec ; Assistant Secretary, Mr. L. P. Berube.

The winners of the first prizes in the several departments are as follows : Mechanical Work, Geo. Hartley ; Stair Building, A. Charpentier ; Lithography, A. Jackson ; Freehand Drawing, T. Grimsdale ; Architecture, Wm. Dowling ; Modelling, Jules Leprohon ; Mechanical Drawing, Clement Johnson ; Decorative Painting, A. Bourgeois ; Plumbing, Geo. Delaney.

THE NEW GRAND TRUNK OFFICE BUILDING.

Through the influence of the Labor organizations, a clause was inserted in the agreement between the city and the Grand Trunk Railway Company, which provides that in the construction of the Company's new office building, for which the city granted a free site, only local labor shall be employed. It is unfortunate for Canadian manufacturers, that the agreement contains no similar clause relating to materials, and if the architect follows his usual practice, the most of these materials will be purchased abroad. The question of where the stone shall come from is understood to be now under consideration. There is an abundance of excellent stone in the province of Nova Scotia, which we hope will find employment.

In this connection, the City Attorney has been asked by the council to give his opinion on a fine point of law. The Grand Trunk Railway Company have recently purchased a stone cutting machine which is to be employed to do the work on their new building, which the council expected would be done by local stone-cutters, and which, it is said, will deprive local workmen of wages to the amount of $20,000. The City Attorney has been asked to give his opinion as to whether the use of this stone-cutting machine will violate the clause in the company's agreement with the city which provides that the work on the building shall be done by workmen residing within the city.

EXHIBITS FOR THE PARIS EXPOSITION.

Mr Chas. Baillarge, architect and engineer of Quebec, ex-President of the Province of Quebec association of architects, proposes to exhibit at the Paris Exposition of 1900, plans, models and descriptions of some of his more important inventions. These will include a method of escape for inmates of public buildings in case of fire (as illustrated and described in previous numbers of the CANADIAN ARCHITECT AND BUILDER); a practical and economical system of founding bridge or other piers in rivers a hundred or more feet in depth as in the St. Lawrence opposite Quebec in 160 feet of water; Design for the London Eiffel tower as proposed in 1889, placed 5th on the list of 68 exhibits, contributed by the foremost engineers and architects of the world ; an electro chromatic revolving fountain ; the Victoria Jubilee Tower, as proposed in 1897 ; Photo-gravure of the St. Foy Monument, erected in 1860 to the memory of the brave soldiers under generals De Levis and Murray who fought the last battle between the French and the English on the occasion of the capitulation of Quebec on its cession to the English by Louis the 15th and La Pompadour. This monument erected after a design by Mr. Baillarge and surmounted by a statue in bronze of Bellona, the gift of prince Napoleon—is itself of cast and wrought iron : the shaft a fluted Grecian Doric column some 5 feet in diameter, on a pedestal having its angles flanked by buttresses, each of which is surmounted by a mortar throwing 12 inch shells, a row or chaplet of which surrounds the base of shaft.

An exhibit of building materials will be made by the city of Quebec, and will include specimens of granite, marble, limestone and crushed quartz from Frs. Parents Laurentian Quarries at Beauport, Que.

NOTES.

The Quebec Government has granted a charter of incorporation to the Montreal Builders' Exchange.

Messrs. Jack & Robertson have recently been appointed Canadian sales agents for the Spague Elevator Company of New York.

Four stained glass windows, each 23 feet in height, are about to be placed in St Patrick's church. In the centre of each window is a figure of one of the Evangelists.

Incorporation has recently been granted to the Diamond Light & Heat Company of this city, with a capital of $200,000, to manufacture burners, radiators, stoves, grates, etc.

The action brought by Mr. O. Martineau, builder of the church of the Immaculate Conception, this city, against the Jesuit Fathers to recover a balance of $7,464.67 claimed to be due him on his contract, has been dismissed by Mr. Justice Pagnuelo, on the ground that the plaintiff had not carried out his contract according to the specifications.

Mr. Stephen Jarvis, Nordheimer Building, has secured the right to manufacture in Canada an artificial stone, the invention of Mr. William Owen. The material is called Owen stone. The process is thus described : Quartzose sand, dug in the vicinity of the works, is first dried by being heated; it is then thoroughly mixed dry with hydraulic lime in the proportion of about 12 per cent. of the former. This mixture, still in a dry condition, is packed into very strong moulds of any desired shape, the filled moulds being subsequently built up in a steel frame or box. The latter is conveyed by tramway to an immense steam cylinder, inside of which it is placed, the cylinder now being closed and the door strongly bolted up. Water near the boiling point is then admitted until the cylinder is is full, and an indicated pressure of from 60 lb. 70 lb. maintained. The water is kept in a highly heated condition by steam coils running along the length of the cyliuder inside, and this is a very essential part of the process. It is claimed for this material that it is fireproof, unaffected by frost, has great crushing strength and can be cheaply manufactured. Mr. Jarvis is endeavoring to organize a Company to manufacture.

HEATING GREENHOUSES BY HOT WATER AND STEAM*

For heating small ranges of greenhouses some of the cast-iron hot-water boilers, although they are comparatively high priced, will prove satisfactory and in the end economical, as they will be more durable than wrought-iron boilers, especially if the latter are made in the form of box coils from ordinary gas pipe. The joints of the latter being screwed together will expose more or less of the threads, and as a result may not last more than two or three years, although with heavy pipe the life of the pipe boiler may be seven or eight years, if care is taken not to have any of the threads exposed. For larger ranges where hot water is used, tubular boilers may be employed and will give good satisfaction, especially if the tubes are placed so as to fill the shell of the boiler. Although these boilers are made of wrought iron, the tubes are thicker than those commonly used for coil boilers and the tubes, being riveted rather than screwed into the boiler heads, will be quite durable. Although not to be recommended for very small ranges, a considerable saving in the amount of pipe required for radiating surface in the houses can be made if the system is placed under pressure. Although there is hardly any limit to the size of the plant in which hot water under pressure may be used, a majority of the greenhouse men prefer steam for ranges of the size that will make the use of a night fireman desirable. While it will require rather more careful attention than a hot-water system, steam as a means of heating greenhouses has some advantages.

For ranges of houses with less than 10,000 square feet of glass only one heater will be desirable, but if the amount of glass exceeds this, two or more should be employed. The heaters should be so arranged that either one can be cut out from the system in case of accident and for the purpose of making repairs. Having more than one heater, under such conditions, will oftentimes prevent serious loss. During the fall and spring months only one heater will be required, the other being held in reserve for use during the severe weather in winter.

PIPING.

For piping houses for hot water circulation there has been a marked change in the kind of pipe used in the last twenty years. Instead of the old fashioned four-inch cast iron pipes, wrought iron pipes from one and one-quarter to two inches in diameter are used for the coils. In some cases the coils include both the flow and return pipes, but more commonly the water is carried to the further end of the house in pipes of a somewhat larger size, which are there connected with the returns. Although larger pipes are occasionally used, the usual size for the flow pipes is either two or two and one-half inches, the former being used for coils containing about 200 square feet of radiation, while the latter will supply 350 feet. When the heater can be sunk so as to be below the level of the greenhouse floor, a fairly good circulation can be secured with all of the pipes under the benches ; but better results can be obtained when the flow pipes are carried as high as possible, and the use of overhead flows becomes almost necessary where it is not possible to lower the heater. One or two of the flow pipes can be carried upon each of the rows of purlin and ridge posts, and others, if necessary, upon the walls. The radiation supplied by the returns will be rather more effective when arranged in horizontal coils than when the pipes are placed one above the other, but from the fact that when the coils, in whole or in part, are carried upon the posts of the side walls they are out of the way, the vertical coil is often used. While good results will be secured whether the flow pipe is carried with an upward or a downward slope, the results, if anything, seem to favor a down-hill system. The slope should be merely enough to free the pipes of air, for which an outlet must be provided at the highest point. It is an excellent plan, especially when the closed system is used, to connect the highest point of each flow pipe, or the highest point of the common system, with the expansion tank. The returns should always be laid with a slight slope toward the boiler, but if the larger sized pipes are used and are properly supported, this need not be more than one inch in twenty feet, the object being to carry the pipes as high as possible, and at the same time have a sufficient slope to permit the air to escape.

HEATING BY STEAM.

The arrangement of the pipes where steam is employed is quite similar to that in the hot water system, the particular difference being that the size is considerably smaller for both the flow and returns. The return pipes need not be larger than one and one-quarter inches, and for small houses very good results can be secured with one-inch pipe. As a rule, a two-inch supply pipe will answer for an ordinary house 20 × 100 feet, except where high temperatures are desired. In the steam system there should be an automatic air valve at the lower end of each of the coils, and for controlling the heat valves are necessary upon both the supply and drip pipes, while in the hot water system only one valve is necessary, although two will be desirable in case there should be occasion at any time to cut off the coil in order to make repairs upon it. In the steam coils it is also well to have several of the pipes provided with valves in order that one or more of them may be cut off to control the heat. In estimating the amount of radiating surface that will be required, it is customary to consider that one square foot of surface will be sufficient for three of exposed glass, if the house is to be carried at 60 degrees, with hot water, and that it will answer for four or five if 50 or 40 degrees, respectively, is to be maintained. With steam heat one foot of radiation will be ample for five and one-half square feet of glass in houses to be heated to 60 degrees, for seven and one-half if 50 degrees is to be maintained, while only one foot of radiating surface to nine square feet of glass will be required in houses that are to be heated to 40 degrees. The above figures will be found substantially correct in sections where the usual winter temperature does not drop below zero, and where the houses are well built and with a comparatively small amount of wall surface.

*From a paper read by Professor L. R. Taft, of the Michigan Agricultural College, before the Missouri State Horticultural College.

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NATIONAL ASSOCIATION OF MASTER PLUMBERS AND STEAMFITTERS OF CANADA.

At a meeting of the executive committee of the above association held in Toronto recently, it was decided that the annual convention should take place in Ottawa on June 30th and July 1st.

Arrangements for this convention are being pushed forward by the local committee of management, which consists of Messrs E. T. Butterworth, R. McCallum, H. Vornam, P. Racine, J. McKinley, F. G. Johnson and H. A. Knox, secretary.

The president of the Ottawa Plumbers' Association, Mr. J. Higman, is understood to be preparing an address for this convention on the conditions surrounding contract work. Mr. Higman will urge a higher standard of proficiency, of prices and of profits.

The delegates appointed to this convention by the Toronto Association are Messrs Wilson, Mansell, Meredith and Wright.

ALIEN LABOR LAWS.

MUCH discussion has taken place of late in and out of Parliament, regarding the non-enforcement of the Canadian Alien Labor Law, in view of the strict manner in which the American law is enforced at Buffalo. The Premier, in explanation, stated that an unwritten understanding exists between the government of Canada and the United States that, in the present interval between the sittings of the Joint High Commission appointed to adjust matters of difference between the two countries, these alien labor laws will not be put in strict operation. He points out that Buffalo is the only point on the border line where the American law is being put into effect, and instances, in support of this statement, the fact that no trouble exists at Detroit, where many of the residents of Windsor find daily employment. It is to be hoped that when the Commission reassembles, these laws may either be wiped off the statute books of both countries, or so modified as to prove a less cause of irritation than at present. In this connection we observe that the Dominion government, in compliance with the expressed wish of the Imperial authorities, have recently disallowed the act passed at the last session of the Legislature of British Columbia prohibiting the employment of Japanese and Chinese by tramway and similar companies.

A recent report from Vancouver states that the building contractors of that city are about to organize a Contractors' Exchange.

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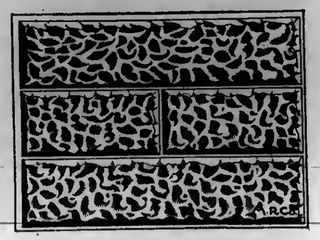

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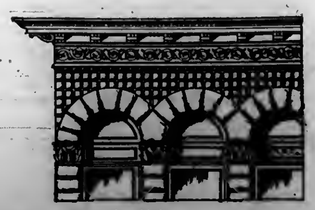

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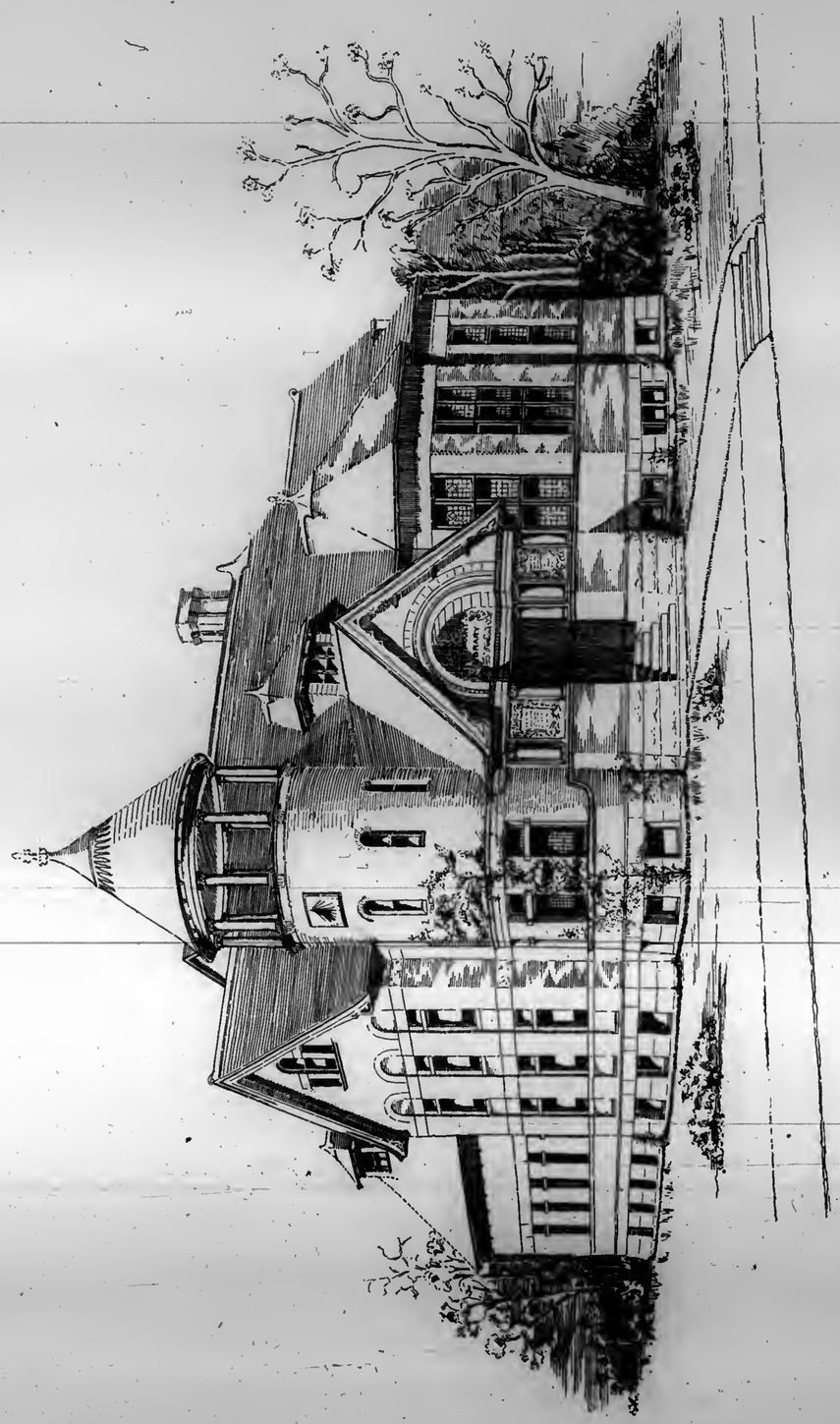

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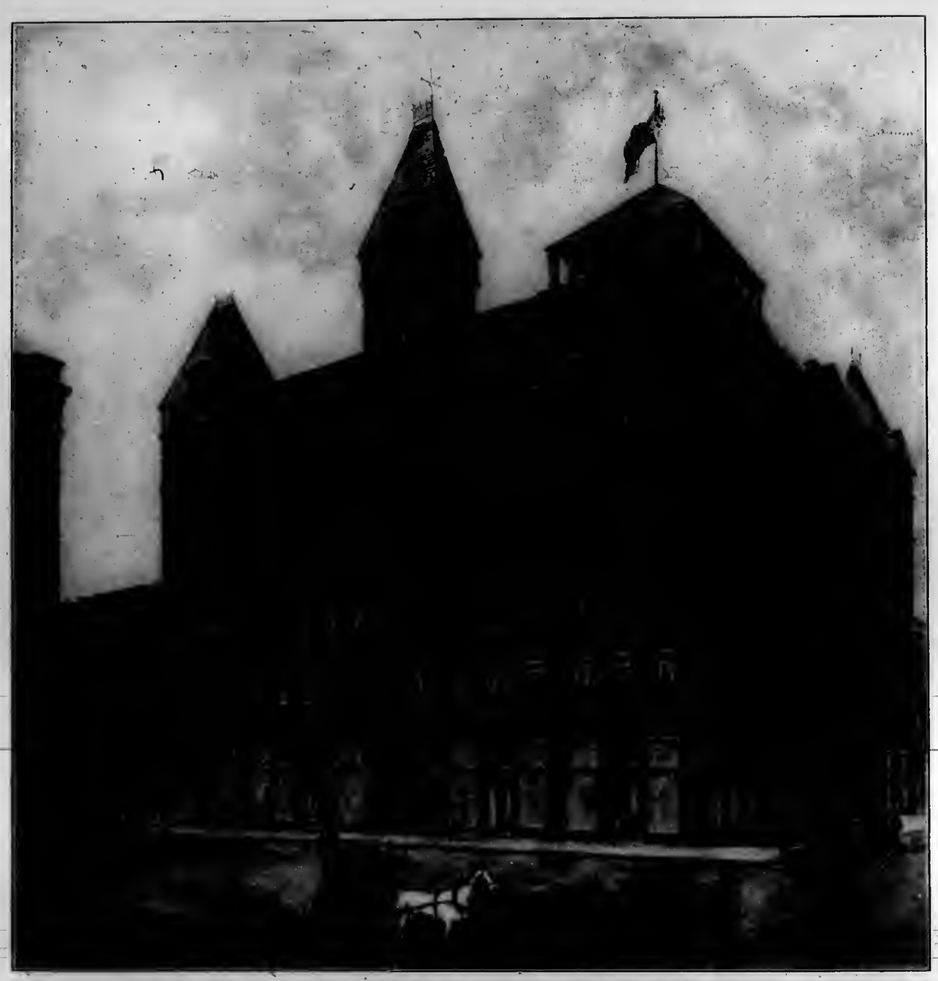

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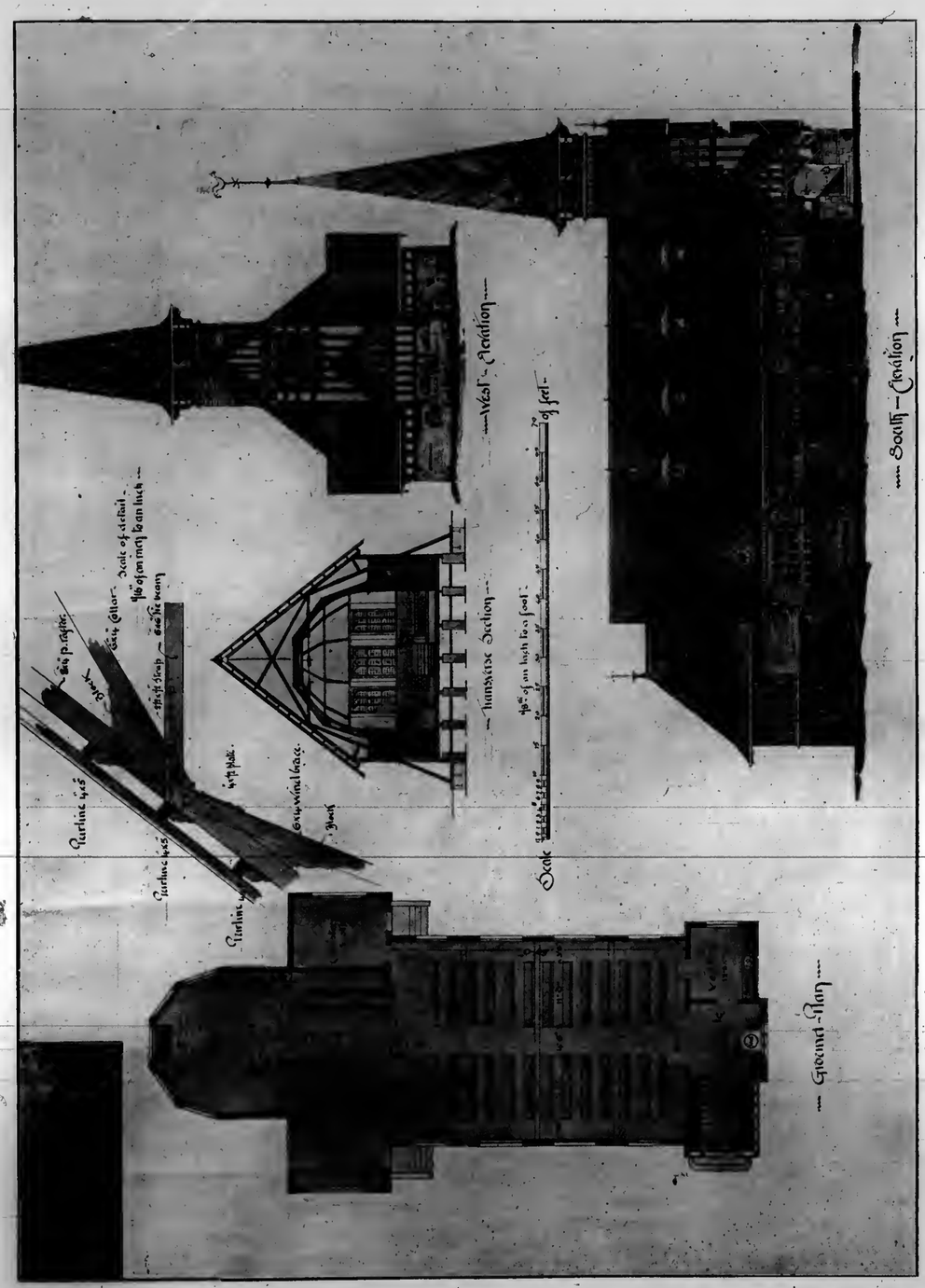

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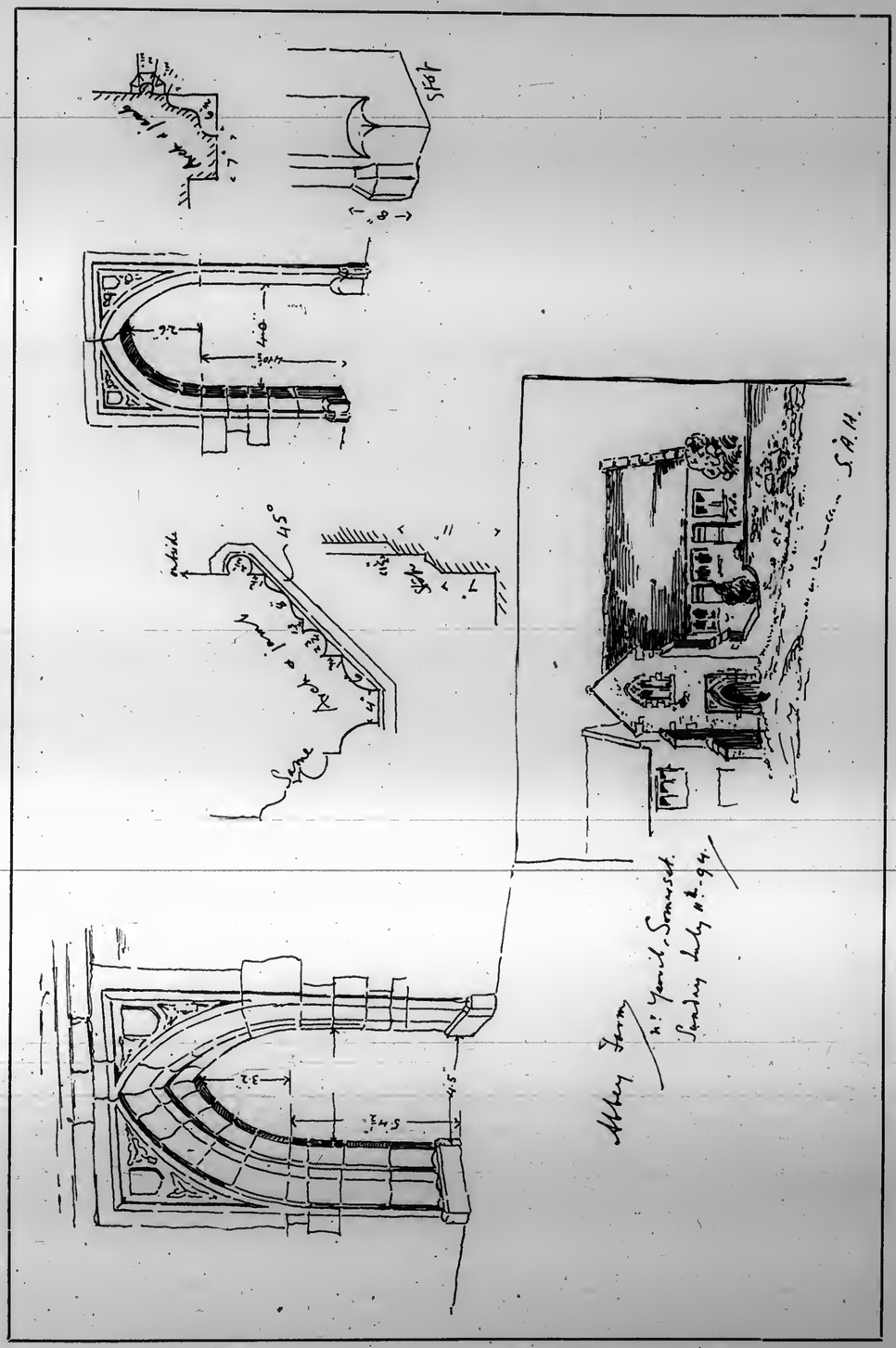

BUSINESS AND RESIDENCE FRONT—YONGE STREET, TORONTO.
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CANADIAN ARCHITECT AND BUILDER.

VOL. XII.—No. 7. JULY, 1899 PRICE 20 CENTS. $2.00 PER YEAR.

—THE—

CANADIAN ARCHITECT AND BUILDER,

A Monthly Journal of Modern Constructive Methods,

(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD).

PUBLISHED ON THE THIRD WEDNESDAY IN EACH MONTH IN THE INTEREST OF

ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

The C. H. MORTIMER PUBLISHING CO. of Toronto, Limited,
Publishers,
Confederation Life Building, - TORONTO, CANADA.
Telephone 2362.

Branch Office: NEW YORK LIFE INSURANCE BUILDING, MONTREAL.
Bell Telephone 2299.

SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to foreign subscribers is $2.50. Subscriptions are payable in advance. The Journal will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrears of subscription paid.

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Prices for advertisements sent promptly on application. Orders for advertisements should reach the office of publication not later than the 12th, and changes of advertisements not later than the 5th day of the month.

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The Toronto Architectural Club.

It is to be hoped that the Architectural Club of Toronto is to be a permanent institution. There is certainly room for one. Time and again, architectural clubs have been formed, but after a season or two have disappeared. The present club has put its existence on record through North America by its action in sending Mr. J. P. Hynes as delegate to the gathering of clubs at Cleveland, Ohio, an account of which appeared in our last issue from the pen of the delegate. The club can do no end of good to the profession, and we would like to see more architects on its membership roll.

A New Climber Wanted.

There has been great destruction this year of many plants that have hitherto seemed able to stand the climate of Ontario. Many garden perennials failed to come up in the spring and will no doubt be noted by gardeners. A failure more interesting to architects is that of the Boston ivy and privet. Strong privet hedges many years old are dead on top and have had to be cut down from six feet high to about two feet. Young plants of Boston ivy, put in round new houses at the close of the summer are all dead, but worse than that is the destruction to old and well grown plants. The standard example in Toronto was Mr. George Gooderham's house which was covered up to the cornice with a thick growth of Boston ivy. This is now cut down to the ground. The work of ten years has to be begun again. The fact that plants on the north side of a building are safe, shows that the destructive agency was not the cold alone, but the cold in connection with a comparatively strong sun; and the cause of damage was really the absence of a bed of snow on the ground, to lie about the roots and stem, and protect them from the warmth of the sun at a time when it was death to the plant if the sap moved. There is nothing to equal the

Boston ivy as an architectural climber. It understands its work thoroughly and, like all subordinates who do, it respects the architect's design. It is the best plant for architects, but since it needs extensive protection the field is open for further discovery in climbers. As to the hedge, the barberry is as good as privet, and examples in Toronto came through the winter unhurt.

The Pan-American Exhibition.

The time has arrived when the great Pan-American Exhibition to be held in Buffalo next year begins to assume practical proportions. The committee of architects who have been directed to design the various buildings has met in Buffalo and inspected the site and after electing Mr. Carriere of New York as its chairman and apportioning the work among its members, it has dispersed to work out the necessary designs. The eminent President of the Exhibition Company, Mr. Bissett, has great hopes that the Province of Ontario will be well represented and to this end he gathered together a large assemblage of Ontario's business men, the members of the provincial government, bankers and others, entertaining them at his own residence and going fully into the details of the exhibition. It is certain that this province can make a fine exhibition and it is to be hoped the opportunity will be greatly patronized.

The British Fire Prevention Committee.

The British Fire Prevention Committee has already issued nineteen publications. In another column is some account of the matter of one these pamphlets. There is no doubt that the Committee is accumulating valuable information, and it is published in a convenient form. The list of publications, up to No. 19, are as follows:

1. What is Fire Protection?
2. American opinions on Fire Prevention.
3. The Paris Bazaar Fire.
4. Theatre Exits.
5. The New York Fire Department.
6. Cotton Fires and Cotton Bales.
7. "Fire Resisting" Floors used in London.
8. Fire Service in Factories, Works etc.
9. Lessons from Fire and Panic.
10. How to Build "Fire Proof."
11. Tests with Unprotected Columns.
12. The Effect of Fire.
13. The Testing Station of the B. F. P. C.
14. Official Fire Tests with Floors (No. 1.)
15. Conflagrations during the Last Ten Years.
16. Experimental Fire Tests with Floors (A.)
17. The Tall Building under Test of Fire.
18. Experimental Fire Tests with Floors (B.)
19. Official Fire Tests with Ceilings (No. 1.)

The prices are not stated on the list, but seem to be from one to three shillings a number. There is nothing in the price to prevent their wide circulation, and certainly public libraries and the libraries of the Architectural Associations ought to arrange to receive all publications as they come out.

The Toronto School Art League.

A movement which had its origin in the United States, is on foot to make school buildings themselves tell as a means of education. At present their effect is either negative or positively injurious to the powers of perception which make up what we call "taste." Some time ago at the opening of the Rosedale School, Toronto, Mr. Hughes, the Superintendent of Public Schools, made some observations on the influence of art education, and referred to the spread of the movement to make school rooms more beautiful. Taking suggestion from this, the ladies of the district immediately organized a league which was named the Ladies League of School Art. Realizing the danger of mere activity without experienced direction, the Rosedale League asked for the co-operation of the Ontario Society of Artists and finally put themselves and their movement into the hands of the Ontario Society. This body devised the establishment of a central Advisory Board for School Art Leagues, and called into consultation the Toronto Guild of Civic Art and certain officials. The Advisory Board has been appointed according to a memorandum prepared by the Ontario Society of Artists. It consists of four ex-officio members viz., the Minister of Education, the Mayor, the Chairman of the School Board and the Superintendent of Public Schools; and of twelve appointed members, to consist of four artists, four architects and four laymen; two of each class to be appointed by the Ontario Society of Artists and the other two by the Toronto Guild of Civic Art. The Advisory Board is now publishing a pamphlet which states the objects of the league and gives information to help forward their attainment. The objects are briefly defined as "good surroundings" for the children. Good surroundings are further defined as, 1st, proper hygienic conditions; 2nd, a good style of architecture; 3rd, good colouring; 4th, mural decorations or framed pictures such as will illustrate the subject matter of school books and train the childrens' eyes to the appreciation of standard works of art. Experiments made at Boston have shown that, in the matter of wall coloring, art and hygiene are at one; the most pleasing tints are also the most restful to the eye. The usefulness of the general hygienic conditions proposed under the first class of good surroundings is also capable of scientific proof. That there is gain in surrounding the children with good architecture and keeping beautiful and noble objects before their eyes is equally capable of demonstration if we put together the numberless little instances in our own experience, and the numberless illustrations that may be extracted from biography and literature of the influence which the character of architecture and the ideas conveyed by works of art have had upon young minds. Affection for home, for school, for church and country may be indellibly stamped in this way upon the mind in youth; making a good foundation for domestic virtues, love of learning, instinctive religion and sound patriotism. That the art which aims merely at sensuous impressions is equally useful is to be doubted. There is such a thing as the mere cultivation of taste which is not a source of strength but of weakness. But that good taste should be used to commend good ideas is a proper aim, and is indeed the true end of art. An excellent appendix to the pamphlet is a list of photographs and casts suitable for this purpose. The size and cost and the dealers from whom they may be procured are given. Photographs of paintings and architecture are classified according to national origin. It is a useful catalogue.

The Rat Portage Brick Company, Limited, has recently been incorporated at Rat Portage, Ont., with a capital of $25,000. The Company will manufacture this season between 3,000,000 and 4,000,000 brick. They also manufacture a good quality of fire brick.

A STUDY OF CONFLAGRATIONS.

The British Fire Prevention Committee have recently published, as No. 15 of their publications, a paper by Mr. Charles E. Goad, whose maps are so well known in insurance offices, read at a meeting of the Insurance Institute, of Manchester. The paper, which is entitled, "Conflagrations During the Last Ten Years," gives an account of the more important fires in English speaking countries during the last ten years, with plans to show the site of the fire and the progress of the flames. The burning of the University of Toronto in 1890, and the three great Toronto fires, which occurred so close together in 1895, receive due notice. The paper was not written for architects, and deals chiefly with the accidents or carelessness and the untoward natural circumstances which were the moving causes in the disasters. But architects may read it with profit, for as it is buildings that are destroyed, there is always a question of building involved somewhere in the story. There is implied in some of the narratives a clear case against wooden buildings, even when detached. We cannot but regret the impossibility of accepting the wooden house which presents such an enviable appearance in American towns; they cost less than brick, have more possibilities of elegance, and, as built now-a-days, are really warmer than brick. But when a fire gets started on any great scale, which is usually when there happens to be a strong wind blowing, the size of the burning fragments that are driven upwards from the blaze, and the distances they will travel, are such that, where wooden houses are common, there is every chance of the fire being enabled to start work in so many places as to divide up the firemen until they have an effective force nowhere. This is what happened when Windsor, Nova Scotia, was burnt in 1897; embers were carried from the place where the fire started to a point 900 yards away "setting fire to isolated buildings all over the town;" and the firemen, finding that the fire was unmanageable, left it and went to look after their own families. The wooden wharf building, which we accept as a necessity, was the origin of the fire that destroyed New Westminster, B.C., and might easily produce trouble in a place like Toronto, where there is a jumble of wooden warehouses along the water front. A southerly wind, upon which in Toronto would depend the communication of fire from the water front to the city, was sufficient for the work in New Westminster. The origin of the conflagration in this place was a startling illustration of how unclassified chances intrude at fires. Three steamers and a coal barge were lying along the wharves at short distances from one another. The time was midnight, or, as Mr. Goad says, 23.30 o'clock. The steamer furthest up stream was moored to the wharf where was the wooden warehouse full of hay, in which the fire started. She soon caught fire, and her moorings being burnt also, started down stream. She immediately collided with the next steamer and set her on fire. These two then drifted down together, picking up as they went the third steamer, and the coal barge. The four blazing vessels all went down stream, keeping close to the wharves, and, with the precision of a plan of attack, set alight one after another the wooden sheds, wharves and canneries for a distance of 500 yards before they swung out into the stream. The flames thus started simultaneously along the ends of seven streets, rushed up the hill with the wind behind, spreading as they went, until arrested by vacant ground at the sides and a 150 foot avenue at the end. It seems apparent that towns on a slope give a slight additional opportunity to a conflagration. That the flames can manage to make their way without this assistance is evident in the history of Chicago, which excels both in its flatness and its conflagration. Great fires in this country seem to have been much influenced by the question of water. Where there were no engines the pressure was reduced below efficiency by opening too many hydrants at once; or hydrants have been found to be frozen; or, worst case of all, at St. John's, Newfoundland, the water pipes were being cleaned, and (with forest fires inland) were empty, and, as the official report says, "it would take at least three hours running of the water from the mains for the pressure to have been sufficient in the quarter where the fire started."

These facts, though interesting, are not exactly within the province of the architect. When we pass over to England, one or two types of contributory causes in the case of the great conflagrations are such as we may note for the purpose of avoiding them. The narrow streets were, of course, easily leaped over by the flames, but worse than this was the facility offered to the fire and the hindrance caused to the firemen by the solid building of the inner part of the blocks. It is one of the interests of London, to a Canadian, to see how these interior spaces are used up. London, in the business part is, at least, one storey high from street to street. There have to be light areas at certain distances from the outsides of the block, but they go no further down than is necessary, and at the bottom the ground floor continues through under a skylight. The want of outside entrance to these courts, the smallness of their area, and the way in which the bottom was enclosed with glass seems to have embarrassed the firemen so, that, as Mr. Goad says, "when fire reached one of these light courts it had free play to attack from 5 to 20 buildings in the rear without any hindrance whatever." It is not apparent why the 5 to 20 buildings should not each afford a footing for men with a hose to fight back the fire's advance. (As there were 51 steam fire engines at the fire and 294 men, there could have been no lack of hose.) It would take longer to get to a position on the roofs behind than to run the hose in along the ground up a back alley; but the London captain, who is accustomed to solid building, should, one would think, lose no time in pining for a back alley, but proceed at once to the next street and advance over roofs to take the fire in the rear. However, if the fire can be reached in this way, it is not so easily reached as from the ground, and we may well hesitate about fitting up, without due regard for either fireproofing or a firemens' approach, the extensive spaces which are now so wastefully left in the centre of business blocks in this country.

There is a precaution against the spread of fire inwards which we may extract from a comment made on several occasions in this paper—that the wind was blowing in the direction in which the fire walls ran. In the Cripplegate fire there was a remarkable radiation of fire walls from the block in which the fire began. Elsewhere Mr. Goad speaks of the extension of the fire over "a good wall" as "a noticeable feature" of a fire, and accounts for it by the shape of the roof and the presence of skylights. In other words, the fire wall is always spoken of with respect. This confidence in the fire wall suggests a more complete system of such walls. Why should there not be, in the business quarter, fire walls

all round every building, so that all winds would be crossed by a wall? In Toronto, at any rate, the practice of draining the roof to a central point and bringing down the rain water conductor inside the building, where it can keep warm, seems to be growing in favor. There is, therefore, no need for the slope to the rear and the open end to the roof in that quarter so favorable for the communication of fire. We may box in each building with a fire wall and have, if necessary, the most severe parapet to the rear. It is assumed that roofs in business quarters will be flat, as indeed they ought to be.

Little is said about iron in this paper, but what is said is startling. In the fire at Charterhouse Square, London, "a large front wall was pushed out by the expansion of iron girders, and in its fall damaged the premises on the opposite side of a very wide street." The burning of the first non-fireproof Simpson building in Toronto is described:—"Eleven minutes after the first alarm, flames burst through the roof, which, fourteen minutes later, caved in and part of the wall fell out. Twenty minutes later the remainder of the Yonge and Queen street elevations fell out into the street." He does not, however, point out that this rapid work was due to the failure and torsion of unprotected iron. After the fire the cellar was full of twisted iron, and fifteen inch beams that had fallen across walls hung like towels on a rail. Unprotected iron is not so much a weak friend as a powerful enemy.

SANITARY REGULATIONS FOR BUILDERS IN PARIS.

In view of the large number of old buildings requiring to be removed and the extensive excavations necessary in connection with the preparations for the Paris Exposition, new sanitary regulations have recently been imposed on the contractors engaged in this work. Past experience having demonstrated that the disturbance of old foundations and old buildings frequently leads to epidemics of fever and other contagious diseases in the locality by the releasing of the disease germs into the atmosphere, the new regulations referred to require that before entering upon the erection of buildings on the sites of old structures, the premises shall be thoroughly disinfected—dusting all these many centers of disease with a preparation composed of one pound of pulverized sulphate of iron, and two and a half pounds of quicklime; while all debris emanating from the demolition, and other excavated material, must be transported to the specially indicated discharging stations or points situated outside of Paris. By way of further precaution, builders are also obliged to erect boarding of a certain height, so as to prevent the dust arising from the excavation from penetrating into neighboring premises. The law also prescribes certain conditions which are to be kept in view at all times as regards the actual demolition process; in fact, all contractors must bind themselves to observe them faithfully before being even permitted to commence operations.

All cesspools, whether of a fixed or movable nature, all wells, all cellars employed as stores for cheese and organic matters, private sewers, subterranean piping, walls, etc., are henceforth to be sprinkled over with a solution of 3 per cent. of sulphate of iron, then properly whitewashed with a solution of quicklime. The greatest care is also to be taken to make sure that the lime wash employed is made with genuine quicklime, and not adulterated with carbonate of lime or whitening. Alum though may be added, the better to enable the lime to unite with the water. In any case, this lime wash of late is becoming less adopted. It was accepted as an efficacious substance against epidemics and infectious disease. Its action upon microbes has been fully recognised; besides, this wash possesses the advantage of absorbing both dust and germs rapidly, while being easily converted into carbonate of lime. However, the authorities maintain that any wash prepared from whitening is to be strictly avoided, due to it containing a gelatine, which is considered more or less putrified, and so constitutes a fertile breeding ground for bacilli.

MR. REID'S MURAL PAINTINGS.

In addition to the views of a correspondent on this subject, printed in our June number, we have received from another source the following: "It is indeed to be hoped that the Toronto Guild of Civic Art is not going to develop into the condition of a "mechanical poor box" that says "thank you" for all it receives, whether it be a trouser button or a quarter. The Guild will belie its personal taste and prostitute its objects if its members have not the courage of their convictions to speak out and give their opinions openly as to the merits and value of art donations to the city. There was published in the Canadian ARCHITECT AND BUILDER, last month, a criticism from a correspondent on Mr. Reid's gift to the City Hall, and while bearing in mind the fact, that even the best examples of art are subject to adverse criticism, it certainly is a serious question, if your correspondent's remarks are correct.

The city may gladly receive the generous offerings of public-spirited men, but the Guild of Civic Art should be able to advise truly as to the intrinsic value, so that poor works may not be given too conspicuous a position or permitted to occupy space that should be reserved for better."

THE STRIKE EVIL.

The unusually large number of strikes, not only in the building trades but in many other liner seems to have been characteristic of this season. Strikes are serious enough of themselves and do an incalculable lot of harm morally as well as financially, but when riots is added as an element of violence we seem to be getting back to the dark ages. Rioting and lawlessness are certainly on the increase among strikers and thereby the general public are made to suffer through the disputes between employers and their men, and to suffer bodily injury as well as mere annoyance or inconvenience. Our police regulations need amendment to meet the new condition of things and the machinery of Dominion legislation should be put in motion to crush out the evil.

CORRESPONDENCE.

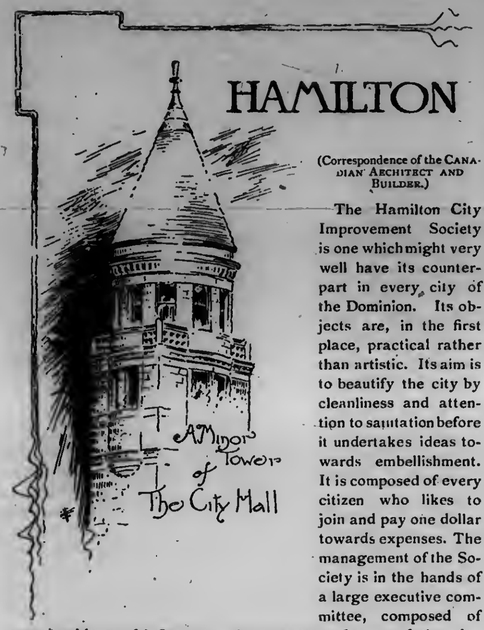
HAMILTON ART SCHOOL.

HAMILTON, July 14th, 1899.

To the Editor of the CANADIAN ARCHITECT AND BUILDER:

SIR,—As you have opened your columns to discuss the working of Art Schools in Ontario, the directors of this school wish to state that they consider it has met the requirements of all classes of citizens. They feel, however, that students do not study in the school sufficiently long to derive the best results, and they attribute the cause partly to the method of granting certificates, and suggest that certificates of 3rd, 2nd and 1st class be granted instead of the one standard as at present, and that the difficulty of a 1st class examination would require at least 3 years' study by an average student before being able to pass it.

Yours truly,
HUGH MURRAY, President.
W. MARSHALL, Hon. Sec.-Treasurer.



HAMILTON

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

The Hamilton City Improvement Society is one which might very well have its counterpart in every city of the Dominion. Its objects are, in the first place, practical rather than artistic. Its aim is to beautify the city by cleanliness and attention to sanitation before it undertakes ideas towards embellishment. It is composed of every citizen who likes to join and pay one dollar towards expenses. The management of the Society is in the hands of a large executive committee, composed of many residents of influence and property, and some of the ministers of various denominations. It is not intended in any way that the organization should be antagonistic to the City Council, but entirely the reverse. It wishes to assist the council by its moral support in the carrying out of all schemes that shall be for the welfare of the city within practical limits. The Society is very young yet, having only held one meeting of the executive, but upon that occasion it was decided to send to the city council a memorandum suggesting various improvements and requesting that instruction be given to the various officials to have the matters attended to. Such matters, for instance, as the flushing of the sewers—a most necessary precaution in a long, dry season such as we are having—the failure to attend to this being a fruitful cause of epidemic. No doubt the proper department of the corporation should see that this is done without having to be reminded by the citizens, but since it is overlooked, it is well to have somebody to give a gentle prod. The cleaning up of the streets in the centre of the city, after "closing time" on Saturday night is also a matter being looked after by the H.C.I.S. It has been the custom for merchants to sweep out their stores into the streets, and on Sunday morning the litter of paper and rubbish at the principal corners has a disgraceful appearance. Perhaps one of the most important functions of the society will be to keep alive the suggested improvement schemes after the decease of the council in which they are first contemplated. Many a good scheme has been propounded, and everything got ready for its execution, and then a new council board being elected the scheme is forgotten and nothing is heard of it again for perhaps many years. In this way it is hoped that all properly digested plans for the embellishment of the city may be carried out within a reasonable time after their conception. It has taken the city something like fifteen years to get the extension of Gore Park carried out, but this has been accomplished this year. According to an old resident it is nearly fifty years since the idea of making the "mountain" slope into a park was first projected and it still remains to be accomplished. It is probable that the society before long will divide up its executive into committees to deal with different branches of improvements, but at present it is all under one head. Mr. R. T. Steele is president and Mr. Dexter, secretary.

It is certainly hard on the students of the art school that they should be made to suffer by the stand that has apparently been taken by the manufacturers and their "boycott" of that institution, for that is practically what it amounts to. I know of more than one case where a student having an especial talent for stained glass work or designing metal work, has devoted as long as two years to the cultivation of his talent because it was pointed out to him that there was a field for him here and that he could make his living in supplying designs for manufacturers. But when his time expired and he has offered his services or attempted to sell his designs, offering them even at a ridiculously low price, not one manufacturer would buy even for the purpose of giving encouragement. There can be no question as to the necessity of a thorough investigation as to the cause, for in the meantime the usefulness of the school is impaired and its influence wasted. Not only that, but the government grant becomes unnecessary, for the school develops into a mere drawing school—the result of its teaching is not the provision of a livelihood for the students in the city. They must pack up and go elsewhere if they would put their talents to good uses.

A convention of Canadian Electrical Engineers has been held here and appears to have been in every way a success. About 150 members from all parts of the Dominion convened at the New Royal Hotel, holding their meetings and making excursions on the different electric railways that converge here.

R. W. GAMBIER-BOUSFIELD.

LEGAL.

The position of sub-contractors' men in relation to contractors is a subject which might well engage the attention of builders' associations. There is no doubt, says the the Builders' Reporter, that the men who are directly employed by the contractor very often impede the men who are indirectly employed. But a case which was heard before Mr. Adshead Elliott as arbitrator in Manchester on the 6th inst. suggests that it would be well to have definite notions about the position of sub-contractors' men in other ways. The applicant was a bricksetter's labourer, and was engaged on some works for which Messrs. Robert Neill & Sons, who are leading builders in Lancashire, were the contractors. The man assisted Messrs. Neill's men in removing columns, and in the course of the work he was injured. The question was, by whom was he employed? The foreman for Messrs. Neill admitted that on the day in question he asked the sub-contractor to lend him some men, but when the accident occurred the labourer was not employed by his authority. Messrs. Neill defended the action on the ground that if they were compelled to pay compensation to sub-contractors' men who meddled with their work after working hours, the liability would be enorous. The arbitrator said that the only man who could possibly bring the applicant into the employment of the firm was the foreman. But he denied that he had obtained the aid of the man after 4 o'clock, and the accident occurred after 5.30. The application was therefore dismissed. In one sense the result is unsatisfactory, for, with a firm whose works are so well organized as those of Messrs. Neill, how could a man be allowed to "meddle" with any of the operations without the knowledge of some official? The removal and setting up of columns cannot be considered a pastime. The men engaged in it are exposed to contingencies, and on that account men alone who have a definite position should be employed. A conciliation board would do well to take up the subject and consider it in all its varieties.

PERSONAL.

The sympathy of many friends is being extended to Mr. A. B. Gordon, architect, Toronto, who was recently bereaved of his wife.

Messrs. F. W. Fuller and D. Ewart, architects of the Department of Public Works, Ottawa, are at present in the Klondyke region for the purpose of supervising the erection of public buildings.

Mr. John S. Hooper, of the firm of S. Hooper & Son, architects, Winnipeg, Man., was united in marriage on June 5th, to Miss M. A. Bell, of Dominion City. Mr. Hooper and his bride were the recipients of congratulatory messages and tangible tokens of esteem from many friends in Ontario as well as Manitoba.

An effort is being made to organize a company to manufacture cement at Durham, Ont. The sum of $14,000 of stock is said to have been already subscribed, with the prospect of the amount being doubled in a very short time.

Chimney Design and Theory—a book for engineers and architects—by Wallace Christie, consulting engineer, &c. New York: The D. Van Nostrand Co.; price, $3.00. The author refers to the lack of printed data on the subject of chimney design and construction as the impelling motive in the preparation of the present work on the subject. The large number of defective chimneys which are met with in every locality is also evidence of the need for a more widespread and thorough knowledge of the subject on the part of architects and builders.

FIREPOOFING MATERIALS.

To the Editor of the CANADIAN ARCHITECT AND BUILDER:

SIR: Mr. Gagnon's letter published in your issue of June is a decidedly strong arraignment of concrete systems of fireproofing and the methods used by these companies to introduce their systems after being practically prohibited in the city of New York; and all who study this question, or have even a secondary interest in it, should feel under an obligation to him for having the courage to publish the information at his command, and for opening up a question of intense interest to the architectural profession.

These companies placed under the law, after a fair trial by the Building Commissioners of New York, rehabilitated by means which were decidedly shady and questionable, are now attempting to persuade Canadian architects that their systems are superior to all others. Their agents, by specious arguments, endeavor to catch the uninformed and unwary, dwelling upon the lightness of construction, saving of weight, and the great tensile strength of concrete, but avoid as much as possible the important question of its ability to resist the action of fire and water—THE CRUCIAL POINT of any system which aspires to be fireproof.

Of what avail the lightness of construction, saving in cost, etc., if the material advocated cannot stand the test of fire and water? Unless it can fulfill THIS condition it becomes useless for the purpose for which it was designed.

One agent, when pressed upon this point, will show photographs of the Pittsburg fire, the Methodist Book Company's building (concrete with suspended wire and iron pipe) and the Horne store (hard tile construction), with the remark "Look and judge for yourself; photos never lie." He carefully suppresses all reports published, and omits to produce a photo of the Phipps building (porous terra cotta). Evidently the latter will not suit his purposes, hence the omission.

2nd. The report of a fire test made by the British Fire Protection Society, London, Eng., which I purpose comparing with the Denver tests before I finish this letter; and finally a test made by the Pittsburg Testing Laboratory, Ltd., which as a test is the most ridiculous I have ever read:

"A slab of concrete, in the lower part of which expanded metal was embedded, 24″ x 24″ x 3″ thick, was supported on iron pegs driven into the ground, leaving 15″ clear underneath. A fire was built underneath of small pine wood and greasy waste. The fire started clear and sharp at 10.57, and kept burning 40 minutes. Dry wood was then applied on top, so the slab was completely surrounded by a sharp fire. It was quenched by a solid stream from ⅝″ nozzle, which continued for 10 minutes. The underside of the slab was damaged but slightly. After three days we discovered recrystallization that would seem to indicate that the composition was getting back to its original set."

To ask any intelligent man to accept such a test is but little short of insulting. A small slab is placed in the open, so much fire as a space 24″ x 24″ x 15″ will admit is kindled and fed for 40 minutes, and we are asked to believe that intense heat was generated and that the slab successfully withstood it, as well as an application of water after. What amount of heat was generated and what portion was concentrated on the slab? It is self-evident that all tests other than official must be looked upon with great suspicion.

As I understand the question of fireproofing, the idea is to keep the steel or iron from being heated, no matter how great the fire, and this seems to me the principle sought for by the majority of inventors for the past eighty years. While the strength of steel is not reduced by a moderate heating, if it be heated beyond 600° Fah., the factor of safety is rapidly reduced, and it BECOMES DANGEROUS, UNLESS PROTECTED BY A MATERIAL WHICH IS CAPABLE OF RESISTING THE EFFECTS OF HEAT. Will concrete or clay best serve the purpose sought? That is a question (until something superior to either is found) which each and every architect must study and solve for himself. A heavy responsibility rests on his shoulders, and it is for him to ascertain if the advice he gives his client is sound or not. I will go one step farther and state, that the architect who has failed to thoroughly grasp all the details of this subject, yet advises his client to use some system of which he has no knowledge (other than that obtained by an agent), not only fails in his duty to his client, but is morally, if not legally, responsible should failure or disaster occur.

Will concrete or clay serve the purpose sought? If we accept Professor Dobie's and Mr. John Webster's, M. Inst. C. E., England, tests, concrete WILL NOT stand the action of FIRE AND WATER. The Pittsburg fire and other serious conflagrations have proved that the conclusions drawn by them were correct; and the following tests, which it must be admitted are unbiased, and which I quote for the sake of comparison, will, I think, convince the most skeptical that concrete and metallic lath systems are not satisfactory, and are very much inferior to clay productions:

(1) Test by the British Fire Protection Committee, London, England. "The object of this test was to record the effects of a smouldering fire of 15 minutes duration of a temperature not exceeding 600° Fah., followed by a fierce fire of one hour, gradually increasing to a temperature of 2000° Fah., followed suddenly for 3 minutes by a stream of water and the consequent rapid cooling." The arch tested was constructed by the Expanded Metal Fireproofing Co.

After one hour's fierce firing we read. "At 4.10 the gas was shut down and the door opened. A SLIGHT DEFLECTION of the soffit was noticed. From 4.13 to 4.16 a jet of water was applied, the pressure varying from 40 to 20 lbs. gradually. On application of the water to the ceiling the portion of the plaster struck immediately fell down. The concrete of floor was slightly and superficially cracked. Two days afterwards the deflection of the centre joist was measured and found to be 1⅜″. The fire did not pass through the floor."

The first thing that arrests one's attention when reading the report is (1) the shortness of the duration of the test—one hour, followed by three minutes application of water. It was certainly not sufficient to thoroughly test the materials used. (2) That when the door was opened it was noticed that the centre joist had deflected. This deflection was afterwards found to be 1⅜″. It is evident that the expanded metal lath ceiling had not fulfilled its function, which, I take it to be, is to protect the concrete and steel from the heat, or why this deflection? (3) On application of water, the portion of the plaster struck immediately fell down, conclusive proof that the ceiling is of little, if any, use. The concrete was now exposed, and if the gas had been turned on for another hour, followed by another application of water, what would have been the result? The question needs no reply. (4) Three minutes were allowed to elapse between the opening of the door and the turning on of the water—the result, possibly, of carelessness. Evidently every latitude as to time and conditions were allowed in this test, yet as a fireproof test it proved an utter failure.

Compare the severe Denver tests with the foregoing, and say whether concrete or clay is most reliable? These competitive tests were made by Messrs. Andrews, Jaques and Rantoul, architects, of Denver, assisted by Thomas, Shepard & Searing, mechanical and electrical engineers, of the same city. The conditions imposed on the competitors were:

1. By still load, increased until the arches were destroyed.
2. By shocks, repeated until arches were destroyed.
3. By fire and water alternately until the arches were destroyed.
4. By continuous fire of high heat until arches were destroyed.

RESULT.

1. The porous terra cotta arch sustained a load of 15,145 lbs., or 757 lbs. per square foot, for two hours without breaking, when the load was discontinued.

2. The porous terra cotta arch withstood four blows from a height of 6 feet, and 7 blows from a height of 8 feet, each arch dropping at the last blow.

3. The porous terra cotta withstood eleven applications of water alternately with extreme heat. Time of test, 23 hours.

4. The porous terra cotta arch, after having a continuous fire under it for 24 hours, was practically uninjured, as it afterwards supported a weight of bricks of 12,500 lbs. on a space 3 feet wide in the middle of the arch.

In my opinion, there can be no question as to the relative merits of the two materials or systems. Clay products are fireproof, concrete is not. Which of you having a furnace or oven to build would specify concrete?

Yours truly,

J. A. PROUDFOOT BULMAN,
Architect.

Montreal, July 13, 1899.

The Church of Our Lady of the Rosary, Vancouver, B.C., will be heated with two Robb hot water heaters of 3,000 square feet capacity each.

A strike of the granite cutters and polishers in the employ of the Victoria Granite Company, and Messrs. Epps, Dodds & Company at St. George, N.B., took place last month. The difficulty arose out of the fact that the employers decided, without consulting the workmen, to close down their mills on Saturday afternoons during the summer months.

BRITISH COLUMBIA LETTER.

II.

THE ferry which plies daily between Victoria and Vancouver is named the Charmer, probably in a spirit of irony, and rounds Brockton Point at 8 a.m. with commendable regularity, and announces her safe arrival with a double whistle of unusually melodious tones. It is not until the Point is passed that the City of Vancouver comes into view, and the scene changes so rapidly as to render the effect almost theatrical. For an hour or so before entering Burrard's Inlet the vessel heads so directly for Howe Sound as to convey to the uninitiated the impression that somewhere within the recesses of that fine fjord Vancouver will be found lying beneath the shelter of the Lions or one or another of the fine mountains that form the brotherly walls of the Sound; but just as one is quite convinced that the Point Atkinson light house marks the entrance to the Narrows, the boat's head is swung round to the east and she steams rapidly along the shore, which is backed with wild looking broken hills covered with melancholy pine forests. Prospect Point to the south and Capilano Creek on the north, define the entry to the first Narrows, which for a mile or so resembles a wide and rapid river with many ugly looking swirls and eddies. The south shore suddenly falls away at Brockton Point and the Inlet spreads out to probably two and a half or even three miles. The ship's head is brought hard round at the Point, and there, straight ahead, lies the Terminal City of which we have all heard so much. The shore line is circular, one horn sweeping away east with a big bend towards the north, which helps to form the second Narrows four miles up, the other end wanders away to the west, meanders around Coal Harbor and the Basin, where it almost makes an island of Stanley Park, barely manages to ripple round Dead Man's Island and thence back to Brockton Point, round which we came in the delectable Charmer but a short while ago.

Moored to the wharves, which occupy the water front for a considerable distance, are several good sized liners, one of the Empresses, the Warrimoo from Sydney, a top heavy looking boat from San Francisco, a number of craft engaged in the now important northern trade, tugs, scows, a sealing schooner or two, and a big four masted barque loading lumber at Hastings mill—all give an air of life to the scene. Viewed from the water the town presents that untidy jumble of buildings that most towns do present from the back, but the imposing mass of the new C.P.R. station stands boldly out from the wilderness and impresses upon you at once its individuality and architectural importance. This building, marking as it does the terminus of the great railway system, which is the raison d'etre of Vancouver, is built on and against a cliff, the foot of which was but a few years ago washed by the clear cold water of this land locked inlet. The permanent way is probably 20 feet below the level of Cordova street at this point, the seaward front is consequently 20 feet higher from ground to sky line than the Cordova street elevation. The building consists of a well proportioned central block with wings right and left; this central or main block rises high above these latter, which are reduced to comparative insignificance by the towers marking the south east and south west angles of the main building which is finished with the steep high pitched dormer dotted roof of the Francois I style, which has been successfully adopted and adapted by the architect. The main entrance from the high level is arched with one broad segmental sweep which abutts upon the towers, but the want of light seriously detracts from the effect of the fine span and voussoirs; indeed, both the wings and the entrance would have gained enormously in character had their height been somewhat greater. The interior of the structure is so far from complete, no opinion can be formed regarding it.

The stranger entering Vancouver from the sea or by rail cannot but observe how narrow and steep is the ill kept approach to the higher level, but for the most part the chief streets have been paved with asphalt which is breaking up badly, or with wood blocks, which, here as elsewhere, are proving vastly superior to the asphalt. Once leave the main streets and the thoroughfares prove to be very indifferent and often very bad, but the wooden sidewalks are invariably in good order and it is pretty safe to prophecy that the roads will be much improved. So many new ways are being made and so great a mileage maintained, it is not expected that a high degree of excellence should prevail. Vancouver is essentially a city of contrasts; things have not had time to even up, and one finds it far from easy to justly criticise this half developed but lusty child of the west only now emerging from the callow stage of extreme youth, and must be regarded more from the standpoint of what it is becoming than from what it is. The place is full of go and energy; shipping comes and goes in ever increasing tonnage; existing streets are rapidly filling up and new ones extending in every direction. Seven banks, most of them in premises of their own, are doing business here. Lumber and shingle mills, sash and door factories, iron works, sugar refinery, boat building yards and many other industries testify to the healthiness of the growth. The most important business streets, Hastings and Lower Granville, Cordova and Water streets, have vastly improved of late—the once great gaps between the blocks are closing up with fairly substantial buildings of from 2 to 4 stories in height.

It is not possible to approach the street architecture of Vancouver in more than a very general manner, giving impressions rather than detailed criticisms. Many buildings are worthy of far more than the slight reference here made to them; some are doubtless overlooked; others are best left severely alone, being, it is hoped, the result of a temporary aberration in taste. A large proportion of the work is, of course, uncompromisingly utilitarian and commonplace. Nearly the whole of the street buildings erected prior to 1895 were designed to meet conditions which are soon to be of the past, but the banks of British Columbia, of British North America and of Montreal are conspicuous exceptions. The first is chiefly distinguished by the boldly arched series of openings on the ground floor and a well handled corner entrance and oriel window. The upper stories are in brick and do not show the vigorous handling of the lower one, but the detailing throughout is refined in a certain school of English Renaissance. The bank of British North America is a well considered massive building in a severer type of Italian, dignified but cold in effect, finely constructed throughout of a hard sand stone that lends itself well to the style. The bank of Montreal is a particularly picturesque composition in modern English Renaissance; the lower floor only is utilized for the purposes of banking, the manager's residence occupying the rest of the building, the two-fold nature of which is admirably expressed in the treatment. The architect has evidently dwelt with loving care over his work, and as the peculiar attraction of this delightful style lies much in the unlimited scope it affords for the application of beautiful detail with great freedom in its handling, it naturally follows that the lover of such will here find plenty to linger over. The grouping of the tower, gable and chimney in the south-west is very clever.

The block of buildings serving as temporary quarters of the C. P.R. is said to be by Bruce Price, but it seems incredible that anything so downright commonplace is to be attributed to an architect of such wide experience. The entrances are mean in the extreme; the scanty little cornices are overwhelmed by the mass of untutored rock they are supposed to relieve, and the most ardent admirer of the uncouth piling up of roughly quarried stone could scarcely enthuse over this example.

The Hotel Vancouver perplexes the wayfaring student of architecture, for it is hard to account for the contrast presented by the old and new blocks. The first, which fronts on Georgia street, is evidently wanting a western wing, and gives one the impression of being the skeleton, as it were, of some well balanced design stripped of all ornamentation and carried into execution by some wholly unsympathetic hand. The second or Granville street block is simply a big brick wall with rows of openings in it—is about as interesting as a respectable tea warehouse in Tooley street, for the passer by might reasonably conclude, but for the height of the storeys, that this triumph is a bonded store. A small entrance on the Granville street front is evidently by a different hand, and though quite out of feeling with either block, is in itself a pleasant feature. Internally, the entrance and the first stairs to the galleries surrounding the top-lighted hall are all good and effective. The great bare dining room sadly needs clothing with color, and a deep, well modelled frieze would greatly improve its proportions.

Next in point of size to the hotel, but in an altogether different class, is Molsons Bank. The facades are executed in the rather sad colored stone that comes from Calgary, but detracts nothing from the dignified proportions of this fine work, which is simple almost to austerity, standing alone in this city as an example of what can be effected without having recourse to the rock-faced affectation. The sparingly used ornamentation is a little flat, and valuable relief is afforded by the broad and deep copper cornice and the attached columns of the uppermost storey. The style adopted is perhaps best described as American-French Renaissance. The unfinished interior, with oak wainscot and linings (much more English in feeling than is perhaps consistent with the character of the exterior), gives promise of great things, though

the deeply coffered ceiling of the banking hall is crowded, wants breadth, and is not well executed in detail. It may safely be predicted that many a day will pass ere Molsons Bank yields pride of place among Vancouver's business premises.

There are at least two new buildings which rival Molsons Bank, but in size only, for they cannot be regarded as rivals from an architectural standpoint. The Fairfield block is a plain, four-storeyed erection without any peculiar claims to our attention, being simply a series of bands of brick alternating with courses of stone—rock-faced, of course. The lintels over the stairs are supported by plain, rectangular, cast-iron posts; the thin looking stairs in the nature of label molds over the arched openings of the third floor do not work in happily; the galvanized iron cornices have a "stock pattern sheet" appearance, and are quite out of keeping with the somewhat rude character of the structure. The worst features are the entrances, which are extremely elementary in conception.

A number of new buildings have been erected and some others are in course of erection. Few are of interest, some being merely sheets of glass framed in white brick and galvanized iron, rather resembling two-dollar looking glasses, and doubtless are as serviceable as they are ugly. However, in more than one instance the architect has boldly enclosed the upper storeys with a slightly stilted semi-circular arch sweeping from outer pier to outer pier, and, by a careful treatment of the diminishing fenestration, has shown that utility and unmitigated ugliness can be divorced. There appears to be an insensate rage for glass, not only in the store fronts, where its presence is, of course, absolutely essential, but in upper storeys used not as show rooms but as offices, where the excessive quantity of glass is quite uncalled for, being a positive nuisance to the tenants in the summer and a strain on the heating system during the winter. From the artistic point of view, what can be said in favor of a material which, the better its quality, the more nearly it resembles a void?

Strange to say, we noticed, besides the Bank of Montreal, the old Hotel Vancouver and the C.P.R. buildings, but one other business building with a roof! Everywhere is a dreary wilderness of decks. Why hide a roof, which of all features is capable of such varied treatment? Certainly the style of building most in vogue is not one that would lend itself readily to visible roofing, but in this mild, moist climate it does seem strange that the deck should be preferred. The necessity of keeping down the cost is doubtless the reason in some cases, but there seems to be a feeling prevalent that a building with a framed roof in evidence has not a business-like appearance, which is ridiculous enough. None the less, the western mind objects to a skyline broken by aught but jogs and steps, for the same fathomless reason that causes western engineers to build roads and streets in rigidly straight lines at right angles to each other. Even the roads which lead out of the city and through the woods are driven straight ahead, regardless of natural contours, resulting in highways not only wearisomely monotonous but distressingly steep, entailing engineering difficulties which might have been frequently avoided and always lessened by sweeping around the bases of the hills. Do western engineers wish us to believe that "there is no use," let alone beauty, in a curved line? But this is a bad digression.

If it were difficult to convey the impression received by a visitor of Vancouver's street architecture, it is still less easy to sum up the result of a necessarily somewhat cursory review of the domestic building. One first notices that the lots are small—so small in some parts of the city as to be suitable only for the erection of houses in pairs or in terraces. Some few houses stand in 132 × 132 feet, though in far too many instances two—and even three—houses are crowded into one lot. It will at once be understood, then, that we need not look for "places" in Vancouver with the lawns, shrubberies, good trees and shady walks, lodges, stable buildings and so forth that are comprised in what are commonly designated "grounds"—for of these there are none. Years hence, when the bush-covered surrounding country has been conquered and cultivated, this serious lack of space will be overcome. At present no man can set his house back one hundred yards from the road unless he goes into the woods, for the city limits are ambitious in extent to the last degree, and embrace an area great enough to accommodate a round half million of people. The development of the town site is consequently not concentrated, and embryonic roads and sidewalks stretch away out into the black stumps in an aimless sort of way.

The type of dwelling most favored in the west end is a two-storied weather-boarded structure, with eaves projecting as much as three, and even four, feet from the wall line. The shingled roofs are usually gabled. The design is based upon the American Colonial, with the exaggerations of the style intensified, and its many elegancies and possibilities in refinement and the picturesque pretty completely lost. Cheap expediency is writ very large in some, and vulgar ostentation in others. It must not be concluded, however, that much of a different character is not to be found, only that it requires searching for among the multitude of commonplaces. The meagre size of the building lots positively bars any building in the broad, spreading manner characteristic of so much fine modern work, a manner which conveys an impression of ease, comfort and elbow room quite beyond the ken of lots which run from five to fifteen to the acre, and frequently subdivided at that! Such sites as these are, indeed, more suited to downright street architecture than to the semi-rustic timber houses which are crowded into them. It is no uncommon thing to see a house, which, having scarcely passage room around it, has none the less a piazza 8 or 10 feet wide within a few feet of the sidewalk. No thorough consideration of such important points as prospect or aspect is possible, neither, indeed, does it appear that any consideration at all is afforded to them in the vast majority of cases. The extreme newness of everything, too, is against both the houses and their surroundings, which sadly need the ever beautifying touch of the hand of Time. One cannot enthuse over brand new stone walls, shiney painted weather boards and precisely tuck-pointed bricks, unless one is a real estate agent or builders' supplies merchant. Fortunately, trees will grow and hide, or at least decently veil, much that is bizzare, or flat and uninteresting. Stone and brick will mellow, ivy creep and roses cluster, in time—all in good time. For the present the lover of the picturesque will find little enough for sketch book and camera among the houses with tarred roofs and French grey weather boards. This same practice of tarring shingles with coal tar is nothing short of barbarous. Surely such violent contrasts are not desirable—the gloomy nature of the climate perhaps inclines one rather to bright than sombre hues—but black, French grey and white is coming it strong. With such fine tones of red, golden brown, silver grey, moss green and ivory, to which shingles and weather boards quite naturally lend themselves, it does seem a thousand pities to disfigure them with coal tar and such paint. If tar is really with some a sine qua non, why not use Stockholm, which affords deep, rich, soft, brown tones, and is a better preservative than the nasty black stuff.

The great projection often given to the eaves is no doubt dictated by the climate, and affords a useful shelter to the upper windows from the drenching and long continued rains, but the treatment of this novel feature is seldom a happy one—horizontally sheeted soffits supported on skinny looking and altogether inadequate consoles being the rule. Those interiors we have been given an opportunity of seeing are for the most part disappointing. Houses with such expensive features as broad piazzas, heavy turned columns, much begabled roofs, circular bays surmounted by towers, etc., are frequently, nay, generally, finished internally with a meagreness quite out of keeping with all this outside show. The contrast sets one thinking of—well, all sorts of things—and it is distinctly amusing to hear that the owner could not afford to pay for more ornament, such as a beam ceiling, some cedar wainscot, tiles on his porch floors, and had to forego a little parquetry, all wall papers, a coat of paint or plaster even, on account of cost—and this with his house stuck as full of circular bays, plate glass, balconies, gables, turnings and so forth as could be crowded on!

It must be borne in mind that this is the west, and that there has not been sufficient time to evolve a standard in matters of taste. There are no old established interests, no cultivated leisure class. The town does not possess a museum, much less a gallery of arts, not even a fine arts society. Every man is fully occupied in making a way for himself, and until he decided to buy a lot and build a house, probably never gave two thoughts to building. His idea of what constitutes the calling of an architect is a beautifully mixed one, and consequently, in his utter ignorance, turns to what he is pleased to call a practical man, with the hapless results that defy criticism. That bogey, the practical man, is ever the most hopeless, unpractical—knows nothing of planning; his designing is not less ridiculous than his planning or more feeble than his drawing; his vaunted practical knowledge is invariably confined to the one trade he followed before he started speculative jerry building operations on his own account.

A stranger visiting Vancouver a few years hence will be able to form a fairer estimate of her architectural values than it is possible to form at present; all is too recent, too absolutely new and hard to be yet judged. Houses which look terribly out of place now, may, as the development of their surroundings proceeds, prove to have been less unhappily conceived, and with increase of years will come a greater appearance of permanence, that which is now so distinctly wanting. But a few years ago the site of the city was an unbroken forest. The first great change came with the falling and sweeping away of the timber, which converted the woods into a melancholy sea of blackened stumps The second transformation is now taking place, and it is only possible yet to get glimpses of what is being brought about. In the meantime everyone who clears a lot or two, plants a few trees and creates a garden, however tiny, is doing a good work, for he is helping to obliterate the scars of wounds inflicted on the face of Nature.

RHYTHM IN DESIGN; OR, THE ANALYSIS AND APPLICATION OF HARMONIC FORM.

By F. Bligh Bond.

I will now enter properly on my theme, starting with this definite and all-important contention as the groundwork of the whole—namely, that there exists in the human mind a power of perceiving harmonic ratio in line, and interpreting it as beauty, precisely as it interprets the effect of harmonic vibrations in sound (as music) and in rhythmic motions; and that it is this power which, consciously or otherwise, lies at the root of all our perceptions of abstract beauty in line and form, and of the sensations of pleasure which may be derived from contemplating it. The existence of such a power may be doubted by some, and no doubt the suggestion may be repugnant to many others, who would prefer to believe that no mechanical laws can bind their sense of the beautiful, which they would regard as belonging to a domain higher than any exact science could carry us, and perhaps an endeavor to lay down such rules would seem to them almost like sacrilege—a degredation of ideal things to a commonplace or materialistic level. The reality, to my view, would be the very contrary, and if, by any effort of mine, I could lift this subject ever so little out of the hazy and chaotic condition it is in at present, and show, beyond all possibility of disproof, that the same fixed and immutable principles underlie our perception of harmony or rhythm in form as in music, I should feel I had helped to lay the foundation for a future appreciation and enjoyment of rhythm in design of a conscious, intelligent, and reasonable character.

I wish to emphasize, by a further allusion to music, my answer to those whose sense of the ideal freedom of artistic design would take alarm at the idea of any mechanical or fixed law obtruding itself into their Elysium. I would ask them to consider whether, if such a law be demonstrated, it need after all involve any restriction or degradation of their ideal freedom of design. Would it not rather furnish them with an intelligible and secure basis on which to raise their work, and give them a test of the correctness of their instincts in interpreting beauty in form? Has the art of music suffered at all from the discovery or application of the physical laws on which musical harmony is founded? Certainly not. The best composers distinctly owe their success in finding expression for their ideas, and thus in producing lasting work, to that ability to translate and interpret the dreams of their genius which is given them by a sound education in the grammar and machinery of harmony.

There have been many schools of musicians, and their respective teachings have no doubt varied within wide limits, but I venture to assert that they would all be in agreement on the necessity of a complete grasp of musical theory, harmony, thorough-bass and counterpoint; and also a knowledge of the physical side of music, of the relationship and nature of different vibrations, before a pupil could expect to become a master, or venture to launch his compositions before a critical musical world.

Why have we no such grammar, no such system of harmony in design, when the perception of harmony in form and discord in form is equally with us, and equally intense in some of us, and, as I verily believe, only awaits systematic education to emerge from the unconscious to the conscious stage? Surely this is a matter for surprise.

There is a broad and marvellous field of delicate and subtle perceptions lying open to us, inviting our investigation, offering rewards of great delight, and how many among us have eyes to see what is there? I fear many of us are gazing into it through the medium of empirical ideas and the distorted views of quack designers. We hear, and heed too much, the sentimental vaporings of artists and art critics, and of all those who, having approached the subject of design from its emotional or poetic side, have discerned no system, or at best only the scattered fragments of one. Are such to be our guides towards a rational understanding of harmony in form? Is this chaos to last?

If the artist or architect could but learn a coherent system of music in form, how vastly would he, and the public for whom he caters, be the gainers, by the increased certainty and lucidity of his work, and the strength and delicacy of his interpretations, and he personally, in the power and delight which his knowledge would then afford him of creating things of beauty.

I have stated that I consider the perception of harmonic ratio in form to be a power latent in us all, though undeveloped, and I think the truth of the proposition can be easily established by reference to some of the simpler harmonic forms, in which the instinctive recognition of harmonic quality and mathematical correctness is developed in most of us to a great degree of refinement, so much so that we are able to recognize the very slightest visible deviations from the perfect form. I refer to the circle and the ellipse. What is true of these simple forms is equally true of the more complex, because these are of essentially the same nature, and we can easily educate our perceptions to be sensible of an error in a complex curve, by care and attention. The power is capable of development to any extent, and only needs systematic cultivation, whilst its increasing refinement and delicacy of operation yields a proportionate degree of pleasure and satisfaction, undreamed of by those who have not studied the subject. We ought in the future to be the possessors of a large number of new perceptions of great delicacy and exactness, and to feel and be stirred by music in form as we now feel it in sound. We ought to be able to discern and reject at a glance, as discord, any deviation from harmonic laws or incongruous or unsuitable juxtaposition of different orders of forms, just as in music we not only take care to observe the laws of harmony, but also take pains that in the orchestration of a piece, the "timbre" of the sound given by the different instruments is properly apportioned and blended, and also that the performance is not marred by the introduction of incongruous movements, such as would present a contradiction in mood or feeling.

Our sense of harmonic correctness in line will, I believe, become capable, after education, of being applied with so great an exactness that almost a hair's breadth deviation will appear to us as an unsightly crippling of the perfect form.* The truth of this proposition may be made familiar by some means of systematic experiment, such as are offered us by the various kinds of harmonographs for the transcribing of musical or

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* I am informed by a friend who has considerable knowledge of India, and experience of native workmen, that the trained castes of designers who produce that truly harmonic and mathematically perfect work in inlaid marble or wood, which delights the whole artistic world, are not in the habit of using any mechanical or mathematical appliances for the working out of their rich designs, but prefer to trust to the safe guidance of their marvellously developed instinct.

the deeply coffered ceiling of the banking hall is crowded, wants breadth, and is not well executed in detail. It may safely be predicted that many a day will pass ere Molsons Bank yields pride of place among Vancouver's business premises.

There are at least two new buildings which rival Molsons Bank, but in size only, for they cannot be regarded as rivals from an architectural standpoint. The Fairfield block is a plain, four-storeyed erection without any peculiar claims to our attention, being simply a series of bands of brick alternating with courses of stone—rock-faced, of course. The lintels over the stairs are supported by plain, rectangular, cast-iron posts; the thin looking stairs in the nature of label molds over the arched openings of the third floor do not work in happily; the galvanized iron cornices have a "stock pattern sheet" appearance, and are quite out of keeping with the somewhat rude character of the structure. The worst features are the entrances, which are extremely elementary in conception.

A number of new buildings have been erected and some others are in course of erection. Few are of interest, some being merely sheets of glass framed in white brick and galvanized iron, rather resembling two-dollar looking glasses, and doubtless are as serviceable as they are ugly. However, in more than one instance the architect has boldly enclosed the upper storeys with a slightly stilted semi-circular arch sweeping from outer pier to outer pier, and, by a careful treatment of the diminishing fenestration, has shown that utility and unmitigated ugliness can be divorced. There appears to be an insensate rage for glass, not only in the store fronts, where its presence is, of course, absolutely essential, but in upper storeys used not as show rooms but as offices, where the excessive quantity of glass is quite uncalled for, being a positive nuisance to the tenants in the summer and a strain on the heating system during the winter. From the artistic point of view, what can be said in favor of a material which, the better its quality, the more nearly it resembles a void?

Strange to say, we noticed, besides the Bank of Montreal, the old Hotel Vancouver and the C.P.R. buildings, but one other business building with a roof! Everywhere is a dreary wilderness of decks. Why hide a roof, which of all features is capable of such varied treatment? Certainly the style of building most in vogue is not one that would lend itself readily to visible roofing, but in this mild, moist climate it does seem strange that the deck should be preferred. The necessity of keeping down the cost is doubtless the reason in some cases, but there seems to be a feeling prevalent that a building with a framed roof in evidence has not a business-like appearance, which is ridiculous enough. None the less, the western mind objects to a skyline broken by aught but jogs and steps, for the same fathomless reason that causes western engineers to build roads and streets in rigidly straight lines at right angles to each other. Even the roads which lead out of the city and through the woods are driven straight ahead, regardless of natural contours, resulting in highways not only wearisomely monotonous but distressingly steep, entailing engineering difficulties which might have been frequently avoided and always lessened by sweeping around the bases of the hills. Do western engineers wish us to believe that "there is no use," let alone beauty, in a curved line? But this is a bad digression.

If it were difficult to convey the impression received by a visitor of Vancouver's street architecture, it is still less easy to sum up the result of a necessarily somewhat cursory review of the domestic building. One first notices that the lots are small—so small in some parts of the city as to be suitable only for the erection of houses in pairs or in terraces. Some few houses stand in 132 × 132 feet, though in far too many instances two—and even three—houses are crowded into one lot. It will at once be understood, then, that we need not look for "places" in Vancouver with the lawns, shrubberies, good trees and shady walks, lodges, stable buildings and so forth that are comprised in what are commonly designated "grounds"—for of these there are none. Years hence, when the bush-covered surrounding country has been conquered and cultivated, this serious lack of space will be overcome. At present no man can set his house back one hundred yards from the road unless he goes into the woods, for the city limits are ambitious in extent to the last degree, and embrace an area great enough to accommodate a round half million of people. The development of the town site is consequently not concentrated, and embryonic roads and sidewalks stretch away out into the black stumps in an aimless sort of way.

The type of dwelling most favored in the west end is a two-storied weather-boarded structure, with eaves projecting as much as three, and even four, feet from the wall line. The shingled roofs are usually gabled. The design is based upon the American Colonial, with the exaggerations of the style intensified, and its many elegancies and possibilities in refinement and the picturesque pretty completely lost. Cheap expediency is writ very large in some, and vulgar ostentation in others. It must not be concluded, however, that much of a different character is not to be found, only that it requires searching for among the multitude of commonplaces. The meagre size of the building lots positively bars any building in the broad, spreading manner characteristic of so much fine modern work, a manner which conveys an impression of ease, comfort and elbow room quite beyond the ken of lots which run from five to fifteen to the acre, and frequently subdivided at that! Such sites as these are, indeed, more suited to downright street architecture than to the semi-rustic timber houses which are crowded into them. It is no uncommon thing to see a house, which, having scarcely passage room around it, has none the less a piazza 8 or 10 feet wide within a few feet of the sidewalk. No thorough consideration of such important points as prospect or aspect is possible, neither, indeed, does it appear that any consideration at all is afforded to them in the vast majority of cases. The extreme newness of everything, too, is against both the houses and their surroundings, which sadly need the ever beautifying touch of the hand of Time. One cannot enthuse over brand new stone walls, shiney painted weather boards and precisely tuck-pointed bricks, unless one is a real estate agent or builders' supplies merchant. Fortunately, trees will grow and hide, or at least decently veil, much that is bizzare, or flat and uninteresting. Stone and brick will mellow, ivy creep and roses cluster, in time—all in good time. For the present the lover of the picturesque will find little enough for sketch book and camera among the houses with tarred roofs and French grey weather boards. This same practice of tarring shingles with coal tar is nothing short of barbarous. Surely such violent contrasts are not desirable—the gloomy nature of the climate perhaps inclines one rather to bright than sombre hues—but black, French grey and white is coming it strong. With such fine tones of red, golden brown, silver grey, moss green and ivory, to which shingles and weather boards quite naturally lend themselves, it does seem a thousand pities to disfigure them with coal tar and such paint. If tar is really with some a sine qua non, why not use Stockholm, which affords deep, rich, soft, brown tones, and is a better preservative than the nasty black stuff.

The great projection often given to the eaves is no doubt dictated by the climate, and affords a useful shelter to the upper windows from the drenching and long continued rains, but the treatment of this novel feature is seldom a happy one—horizontally sheeted soffits supported on skinny looking and altogether inadequate consoles being the rule. Those interiors we have been given an opportunity of seeing are for the most part disappointing. Houses with such expensive features as broad piazzas, heavy turned columns, much begabled roofs, circular bays surmounted by towers, etc., are frequently, nay, generally, finished internally with a meagreness quite out of keeping with all this outside show. The contrast sets one thinking of—well, all sorts of things—and it is distinctly amusing to hear that the owner could not afford to pay for more ornament, such as a beam ceiling, some cedar wainscot, tiles on his porch floors, and had to forego a little parquetry, all wall papers, a coat of paint or plaster even, on account of cost—and this with his house stuck as full of circular bays, plate glass, balconies, gables, turnings and so forth as could be crowded on!

It must be borne in mind that this is the west, and that there has not been sufficient time to evolve a standard in matters of taste. There are no old established interests, no cultivated leisure class. The town does not possess a museum, much less a gallery of arts, not even a fine arts society. Every man is fully occupied in making a way for himself, and until he decided to buy a lot and build a house, probably never gave two thoughts to building. His idea of what constitutes the calling of an architect is a beautifully mixed one, and consequently, in his utter ignorance, turns to what he is pleased to call a practical man, with the hapless results that defy criticism. That bogey, the practical man, is ever the most hopeless, unpractical—knows nothing of planning; his designing is not less ridiculous than his planning or more feeble than his drawing; his vaunted practical knowledge is invariably confined to the one trade he followed before he started speculative jerry building operations on his own account.

A stranger visiting Vancouver a few years hence will be able to form a fairer estimate of her architectural values than it is possible to form at present; all is too recent, too absolutely new and hard to be yet judged. Houses which look terribly out of place now, may, as the development of their surroundings proceeds, prove to have been less unhappily conceived, and with increase of years will come a greater appearance of permanence, that which is now so distinctly wanting. But a few years ago the site of the city was an unbroken forest. The first great change came with the falling and sweeping away of the timber, which converted the woods into a melancholy sea of blackened stumps The second transformation is now taking place, and it is only possible yet to get glimpses of what is being brought about. In the meantime everyone who clears a lot or two, plants a few trees and creates a garden, however tiny, is doing a good work, for he is helping to obliterate the scars of wounds inflicted on the face of Nature.

RHYTHM IN DESIGN; OR, THE ANALYSIS AND APPLICATION OF HARMONIC FORM.

By F. Bligh Bond.

I will now enter properly on my theme, starting with this definite and all-important contention as the groundwork of the whole—namely, that there exists in the human mind a power of perceiving harmonic ratio in line, and interpreting it as beauty, precisely as it interprets the effect of harmonic vibrations in sound (as music) and in rhythmic motions; and that it is this power which, consciously or otherwise, lies at the root of all our perceptions of abstract beauty in line and form, and of the sensations of pleasure which may be derived from contemplating it. The existence of such a power may be doubted by some, and no doubt the suggestion may be repugnant to many others, who would prefer to believe that no mechanical laws can bind their sense of the beautiful, which they would regard as belonging to a domain higher than any exact science could carry us, and perhaps an endeavor to lay down such rules would seem to them almost like sacrilege—a degredation of ideal things to a commonplace or materialistic level. The reality, to my view, would be the very contrary, and if, by any effort of mine, I could lift this subject ever so little out of the hazy and chaotic condition it is in at present, and show, beyond all possibility of disproof, that the same fixed and immutable principles underlie our perception of harmony or rhythm in form as in music, I should feel I had helped to lay the foundation for a future appreciation and enjoyment of rhythm in design of a conscious, intelligent, and reasonable character.

I wish to emphasize, by a further allusion to music, my answer to those whose sense of the ideal freedom of artistic design would take alarm at the idea of any mechanical or fixed law obtruding itself into their Elysium. I would ask them to consider whether, if such a law be demonstrated, it need after all involve any restriction or degradation of their ideal freedom of design. Would it not rather furnish them with an intelligible and secure basis on which to raise their work, and give them a test of the correctness of their instincts in interpreting beauty in form? Has the art of music suffered at all from the discovery or application of the physical laws on which musical harmony is founded? Certainly not. The best composers distinctly owe their success in finding expression for their ideas, and thus in producing lasting work, to that ability to translate and interpret the dreams of their genius which is given them by a sound education in the grammar and machinery of harmony.

There have been many schools of musicians, and their respective teachings have no doubt varied within wide limits, but I venture to assert that they would all be in agreement on the necessity of a complete grasp of musical theory, harmony, thorough-bass and counterpoint, and also a knowledge of the physical side of music, of the relationship and nature of different vibrations, before a pupil could expect to become a master, or venture to launch his compositions before a critical musical world.

Why have we no such grammar, no such system of harmony in design, when the perception of harmony in form and discord in form is equally with us, and equally intense in some of us, and, as I verily believe, only awaits systematic education to emerge from the unconscious to the conscious stage? Surely this is a matter for surprise.

There is a broad and marvellous field of delicate and subtle perceptions lying open to us, inviting our investigation, offering rewards of great delight, and how many among us have eyes to see what is there? I fear many of us are gazing into it through the medium of empirical ideas and the distorted views of quack designers. We hear, and heed too much, the sentimental vaporings of artists and art critics, and of all those who, having approached the subject of design from its emotional or poetic side, have discerned no system, or at best only the scattered fragments of one. Are such to be our guides towards a rational understanding of harmony in form? Is this chaos to last?

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I have stated that I consider the perception of harmonic ratio in form to be a power latent in us all, though undeveloped, and I think the truth of the proposition can be easily established by reference to some of the simpler harmonic forms, in which the instinctive recognition of harmonic quality and mathematical correctness is developed in most of us to a great degree of refinement, so much so that we are able to recognize the very slightest visible deviations from the perfect form. I refer to the circle and the ellipse. What is true of these simple forms is equally true of the more complex, because these are of essentially the same nature, and we can easily educate our perceptions to be sensible of an error in a complex curve, by care and attention. The power is capable of development to any extent, and only needs systematic cultivation, whilst its increasing refinement and delicacy of operation yields a proportionate degree of pleasure and satisfaction, undreamed of by those who have not studied the subject. We ought in the future to be the possessors of a large number of new perceptions of great delicacy and exactness, and to feel and be stirred by music in form as we now feel it in sound. We ought to be able to discern and reject at a glance, as discord, any deviation from harmonic laws or incongruous or unsuitable juxtaposition of different orders of forms, just as in music we not only take care to observe the laws of harmony, but also take pains that in the orchestration of a piece, the "timbre" of the sound given by the different instruments is properly apportioned and blended, and also that the performance is not marred by the introduction of incongruous movements, such as would present a contradiction in mood or feeling.

Our sense of harmonic correctness in line will, I believe, become capable, after education, of being applied with so great an exactness that almost a hair's breadth deviation will appear to us as an unsightly crippling of the perfect form.* The truth of this proposition may be made familiar by some means of systematic experiment, such as are offered us by the various kinds of harmonographs for the transcribing of musical or

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acoustic curves, or the resultants of compound pendulum vibrations. These most interesting and instructive little machines are not nearly so well known as they deserve to be, but with their aid I have sought, and have found, a perfect correspondence beween mathematical correctness and and æsthetic value, in all the forms which have come under my notice ; and having tested the effects of some thousands of these lines upon my own perceptions, I have fully satisfied myself not only that in our recognitions of abstract beauty we are fully under the dominion of those permanent mathematical principles of ratio which rule in the physical domain, but that these principles, in their application, might be to a large extent classified and formulated by the use of the designer, and a grammar of harmony constructed.

The most lamentable result of the want of training of the harmonic sense is that we are by no means so sensitive as we should be about the employment of crude and makeshift forms, and our natural delicacy of perception has been blunted by the adherence to false rules and unworthy models, whose sole merit has, in many cases, been their antiquity.

What perceptions of form Nature has educated us into by inviting us to observe the growth of herb or limb, we have to a great extent corrupted by the blending of natural or harmonic forms with those of a geometrical or hard mechanical sort, in ways utterly unnatural and utterly preposterous, until now many of us do not know a good line from a bad one. There is, of course, speaking of geometrical forms, always an exception to be made where architects are concerned, for building conveniences demand a certain squareness and angularity of outline ; but I contend that a skilful architect, knowing his grammar of harmony, would never be mastered by such conveniences, but, whilst duly respecting them as necessary conditions, would always, in his designs, rise superior to them, and make them subservient to his harmonic scheme, when they would be traceable only as basic forms, lending stability and repose, but whose nakedness is draped by the skilful hand of the designer, so that their severity is lost, whilst their vigor is retained.

I have now reached a point at which I must try to clearly define rhythm. I will try to formulate (1) its nature, (2) its application to design.

(1) Rhythm is the effect of natural motion or motions having periods bearing a definite ratio to one another, acting in a given direction, and combining to form an harmonic sequence or series of movements.

(2) Rhythm in design is the art of registering and applying or adapting the forms created by the interaction of these natural motions in their various phases ; the sequence of their relationship being thus tabulated as a curve, so that the eye may simultaneously grasp and understand the whole period of the movement, such curves forming the basis upon which a complex design may be built up.

From the foregoing we deduce the following :—

(a) Every line is a progression and should be viewed as such in order to be truly understood.

(b) Every true line, except the absolutely straight line, is an harmonic progression, and pictures the operation of a force or forces. In its dynamic nature lies its vitality, and its artistic character is directly dependent upon its correct representation of force.

I will also add :—

(c) Every complex line or curve possessing the above nature has the attribute of beauty, the eye perceiving the consistency of the law governing it.

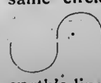
(d) The arbitrary juxtaposition of curves following different laws, or not containing the same harmonic elements, is inferior in beauty and in force or vitality, the eye detecting as discord the divergence in principle.

I could illustrate by abundant examples both these latter rules which I have postulated. But a few considerations, by way of illustration, are all that will be necessary for the present, and I think both principles will be found easy of application if a little study be given to them. Let me ask you to make a collection of all kinds of harmonic curves, and study them intelligently, tracing the direction of the forces of which they are the resultants, and you will soon begin to acquire what I may style the "dynamic sense," which is really a more intelligent development of the "harmonic sense," by which we instinctively perceive beauty. The application of these to design will become easier and more certain. Especially in designing wrought-iron scroll-work will the process be found beneficial.

But before studying complex curves, there is much to be learned from the careful consideration of the simplest harmonic forms : the circle, ellipse, spiral and parabola. Of any of these, we seem to be licensed, by our intuitive sense of what is proper, to take parts only for use in architectural and general design, or, if desired, to put two similar segments of the same curve in opposition, as in pointed arches, foiled circles, ogees, etc. What we are not entitled to do is to produce a mongrel curve, simulating a complex harmonic curve, by joining together, end to end, portions of simple or circular curves. This is an important rule, generally disobeyed, especially in late Gothic or Renaissance designs. The instinct of designers would seem to have been sadly blunted, or to have gone much astray, when they could be satisfied with such mongrel or crippled curves as these very generally are.

Let my rule be applied, for instance, to that most hideous of curves, the so-called "three-centred ellipse." This curve is without consistency, following no uniform law, and therefore destitute of dynamic vigor. Its effect on the really sensitive eye is quite painful, yet it passes muster frequently among latter-day architects.

In respect of the more subtle and sophisticated "five-centred ellipse," most of us have not our harmonic sense sufficiently attuned to feel its harshness. In the same bad category I must place the Tudor four-centred arch, and all those ogees which are compounded of circular curves of varying radius.

Neither is the combination of two segments of the same circle in contrary flexure a satisfactory one  . It is far from being as pleasing as Hogarth's line of beauty, which follows a uniform harmonic law from end to end—that is, it represents the whole period of a certain complex vibration.

Not to unduly multiply instances, I will content myself with mentioning one of the worst transgressions of all—namely, the junction of the circle and the straight line. Frequently one sees what is called a flat arch—that is, having horizontal voussoirs, and to this is given rounded corners. The form may have conveniences, as

all straight lines are convenient—too convenient, alas ! —for builders, but where is the excuse ? A very slight alteration would restore to the line an harmonic quality. The Burgundian architect effected this by the very appropriate use of a counter curve in the centre, almost annulling the straightness of the remnant of the line.

I must now revert to the basic or geometrical forms, which are founded on the straight line. Architects can never ignore these. It is impossible, and it is not desirable, that we should get quite away from them. Architectural construction, which is dependent on equilibrium, can never violate the laws of stability in the mass, and therefore squares, levels and perpendiculars will form the framework of building for all time. But if architectural with general design is to be regarded as the expression of living forces, as may be inferred from the rules I have laid down, then it becomes a question how we are to confront and deal with those basic elements of straightness and rigidity which are in themselves dead, and devoid of rhythmic energy, and are, as one might say, the skeleton within the living flesh.

Straight lines in their absolute nakedness are expressive only of passive stillness and monotony. An ornamental arrangement of straight lines only can never satisfy, though under certain conditions it may please, but you will most assuredly find that the pleasure to be derived from straight lines is not a positive pleasure at all, but at best an agreeable feeling of reaction experienced by way of contrast after the eye has had an overdose of luxuriant curvature. The use of the dead square line should, I think, be reserved by future designers for tombs, mausolea, and such-like temples of death, as an emblem of eternal stillness and inflexible destiny.

Nature gives us no argument for the use of the absolute straight line, as no natural line is really straight, but, from some point of view or other, will be found to possess subtle curves. Her lowest order of forms—the crystalline—produced by the action of simple molecular forces, is constructed, it is true, upon a geometrical basis ; but they all present, in the natural state, certain irregularities of outline, which redeem them in the mass from absolute monotony.

In the vegetable kingdom the rhythmic expression of the living forces of growth and expansion comes into fuller play, and the characteristic outlines indicative of the vital forces peculiar to each herb becomes more complex and beautiful as we ascend the scale of evolution. In the infinitely varied outlines of growing things we detect a harmonious working out of two forces—the alternation of development and restraint, or the lines of interaction between energies of opposite tendency, giving us a variety which can never stale.

All these forces, together with the pendent curves produced by gravity, and the perception of continuity of structure, are translated by the inner perceptive faculty as harmony, and conveyed to the inner sense as beauty.

Reverting for a while to what I said concerning the use of square lines in design, and the inharmonious result of a mere mixture of straight lines with curved ones, I cannot of course be supposed for a moment to advocate a wholesale departure from straight lines in design, nor do I. But there are two ways of using them, having markedly different optical results. If used unskilfully in, let us say, an architectural design, the straight line will assert itself among countless other features very clearly, and its native harshness will not be disguised ; and why?—because it is not combined or interwoven with lines of other tendency, so as to suggest to the eye any more harmonious line formed by the sum total of all the features. It is all the difference between a mechanical mixture of two different elements, and their chemical combination. But it is possible, and easy enough if proper care be given, so to regulate your smaller features in a design that they may form a series of points upon a general "line of suggestion," the effect of which upon the eye will be sufficiently obvious to withdraw attention from the rectilinear backbone, and the severity will disappear. The minor features yielding the chosen "line of suggestion" must be of sufficient size and frequency to form a well-marked series, but they need not in themselves take any particular shapes so long as they are ot the right projection. Their individual shape does not count in the total effect, except in a secondary manner. In one direction only, the horizontal, does the unadulterated straight line appear to be correct and satisfying, and the reason for this appears to be that the straight line is expressive of constant or uniform motion, which is a kind of motion only natural in a horizontal direction.

Vertically all propulsions of force are subject to the laws of gravity, causing progressive retardation in rising, and acceleration in falling, yielding more or less parabolic figures, and I feel quite clear that, unconscious though we may be of the existence and requirements of our "dynamic sense," it is always urging us most strongly to obey these laws in design.

I feel I ought to make one exception, in favour of the use of the vertical straight line in a limited manner, and that would be when it is used in the formation of a pendent. In such a feature my rules would permit of its use, as it there symbolizes a constant force acting vertically downwards.

I now wish to speak briefly on the subject of the simplest and most elementary of harmonic lines—the circle. This beautiful figure expresses either of two sorts of motion, and can be built up from each. It is formed :

(1) By the motion of a point at a uniform distance about a centre.

(2) By two rectilinear motions of equal period and extent, acting upon the same point at right angles to one another, and alternating in time.

The circle, or sphere, is the simplest of natural forms, and very close and perfect approximations to it are found in organic nature. But though it is the parent of all other graceful forms, it is not fitted for indiscriminate use in design, on account of two characteristics :

(1) In general design, because of its monotony.

(2) In architecture, because it is not a form subject to the laws of stable equilibrum.

The latter objection applies, of course, only to spherical or circular masses, not to circular spaces, as these, having no weight, cannot offend the law of equilibrium.

Parts of circles, or parts of spheres, are, however, a matter of everyday use and convenience, and were it not for their extreme and sometimes painful monotony, might be considered the most essentially useful element in architectural design. The ease with which purely circular forms may be struck, as distinguished from the more complex harmonic sweeps and curves, tends to make them permanently popular, and long custom has rendered them traditionally correct.

We have next to consider the elliptical form, which is directly derived from the circle, as the circle yields

the ellipse when viewed in perspective. Here we have a really rythmic form, and the trained eye traces with interest, as well as with delight, the interaction of the two forces which produce it: the vertical, which is retarded or lessened by insensible gradations as the crown of the curve is reached; and the lateral, which is correspondingly accelerated or increased. Every part of a true ellipse is musical in form, just as its counterfeit (of compound circular origin) is harsh and discordant.

It is a wholesome sign of the progress of refined sensibility amongst modern architects, that they are beginning more generally to appreciate the beauty of true elliptical forms, and to make use of them.

In the same category as the ellipse I will place the parabola, which is of kindred nature, though an open curve, and is one which may be used in its entirety in architectural work (as, e.g., in forming a "line of suggestion" for the general skyline or contour of a group of buildings, or large building with numerous salient features) in entire accordance with the laws of stability and equilibrium.

The parabola is the product of various combinations of natural forces, but for our purposes may be regarded as the resultant of two simple vibratory motions—the horizontal one having exactly twice the period of the vertical one. It is a curve which is most delighttul to the eye, and thoroughly well fitted for application to architectural design, especially in roofs and skylines.*

From the parabola, it is an easy step to the more complex harmonic lines which are the resultants of two or more forces of other ratios than 2: one acting upon one another at right angles, and with various amplitude. In some of these now in my possession, executed by the mechanical means already suggested, or by the simple mathematical process of plotting the curves on squared paper, the effect is almost magically beautiful—the most characteristic being those in which, upon the basic form of the ellipse, parabola, or lemniscate, there are grafted subtle variations produced by the presence of higher harmonics in a subordinate degree—precisely analogous to those strictly subordinated harmonies which in musical instruments yield such varying "timbre" with the same basal note, and which give to the different instruments diverse tones—hard, soft, liquid, mellow, metallic or brazen, full, thin, rich, reedy, etc. All these have their counterparts, more or less recognisable, in the character of lines. It is a fact well known to science that each of these qualities in a musical instrument is the direct result of a particular selection of certain harmonics in certain degrees of strength, accompanying the fundamental note; and so far-reaching is the law that it controls even the formation of vowels and consonants, which have all been successfully imitated by the incorporation of their proper harmonics.

In the same way, by skilfully blending and applying the harmonic principle to lines, we can give them an expression of force or feebleness, richness, wiriness, rigidity, flexibility, grace, sternness, and what not; but to be able to do this with certainty and clearness of expression, we should have a conscious knowledge of the laws which we are calling into operation.

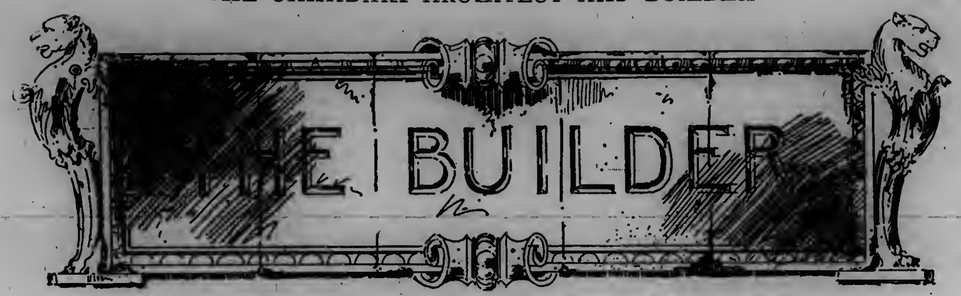
Having indicated that the character and artistic value of a line is the outcome of harmonic elements properly selected and applied, I now come to speak of what we call "conventional" design or ornament.

Conventional representations of any well-known class of forms is merely the arbitrary choice of those harmonic principles in a form which gives it its distinctive character, or "timbre," or, if I may so term it, "flavour." In all natural forms there are essential characteristics which are the result of the working of special harmonic principles, besides a great many variations of a more intricate kind which are the outcome of accident or circumstance. It is the business of the conventional designer to select the one, and to discard the other; and this sorting or weeding-out of the essential from the non-essential preserves, as it were, the soul of the form, whilst rejecting its material part.

Conventional representation (like time, tune, and orchestration in music) is therefore an orderly classification which conveys to the æsthetic sense a clear, select, and definite impression easily understood at a glance. If then, as we have seen, our appreciation of the simpler harmonic forms as found in the vegetable world depends to a very large extent upon our conception of the growth, movement, and special vital characteristics of the different orders of plants, then, in a similar way, our appreciation of beauty in the higher forms of man and animals depends upon our knowledge of, and our ability to understand, the various powers and capacities of movement which the position and sizes of the muscles, or the proportions of limbs and trunk denote. But with animal and human types, architectural art has little or nothing to do in its structural portions, as it is an art expressive of fixity in position, whilst these forms are entirely expressive of, and characteristic of, locomotion. There are, therefore, very few instances in which the incorporation of the human form as an architectural feature can be regarded as even a qualified success. Those great sitting giants forming the facade of the rock temple of Abu Simbel in Egypt are, to my mind, about the most legitimate, or least unsuitable, instances of its application. From their stupendous size and massive breadth of treatment, as also from their resting posture, they have a certain appropriateness inspiring a sense of repose, stability and permanence, and thus seem to satisfy that sense in us which looks beyond the material or concrete expression, and, as I have endeavored to show, sees in the humblest line a symbol of those eternal vitalities which throb ceaselessly throughout the visible world, and whose music is intuitively felt by us, although we have not yet arrived at the full and conscious recognition of it in all its manifold presentments.

A remarkable project has been, according to the Plumbers' Review, London, undertaken by the West Australian government, namely, to lay some 328 miles of water pipe, made of steel spiral embedded in concrete. In the manufacture of this pipe the sheet steel, after being cut into strips of a width varying with the required diameter of the pipe, is rivited or welded into a continuous strip of the required length; this strip is then fed automatically into the pipe-making machine, and during its passage through it the rivet holes are punched, and the laps of the edge of the strips are brought together under pressure and held during the process of riveting. The rivets are all set by compression. The edge is slightly recessed, throwing the lap on the outside. In this way the inside diameter of the pipe is maintained evenly throughout the entire length. To render the pipe water-tight on leaving the machine, special hydraulic cement is inserted between the laps before riveting.

* The chief source of that extreme sense of refinement conveyed by Oriental architecture is the general use of parabolic or cycloidal curves in preference to circular ones.



[THIS DEPARTMENT IS DESIGNED TO FURNISH INFORMATION SUITED TO THE REQUIREMENTS OF THE BUILDING TRADES. READERS ARE INVITED TO ASSIST IN MAKING IT AS HELPFUL AS POSSIBLE BY CONTRIBUTING OF THEIR EXPERIENCE, AND BY ASKING FOR PARTICULAR INFORMATION WHICH THEY MAY AT ANY TIME REQUIRE.]

Warm Frame Houses.

There are three methods of protecting the walls and floors of frame buildings, so as to make them almost frost proof, and which are simple and comparatively inexpensive. First, the floors must be laid in either one of the following ways: Nail strips 1 x 2 inches, along the sides of the joists, about two or three inches from the top edge. On these strips lay a false floor and nail well; then fill in with lime or cement mortar to the level of the joists. When dry, lay over this two thicknesses of heavy felt or building paper, and lay the finished floor over all. Or the joists may be covered by a solid matched floor, well nailed, then lay two thicknesses of felt, and lay the finished floor over all. A third method is to strip the joists as mentioned above, then lay false floor, on this lay tarred felt paper, seeing that the paper runs up the sides of the joists and laps over their edges, and that all the joints of paper are well broken. Fill in with lime mortar to top of joists and over this lay the finished floor. The first method is the better one, but either of the other will answer very well. For the walls, in which the studding is assumed to be 2 x 4 or 2 x 6, cover inside and out with surface boards and then covered with felt or other good paper well lapped over and nailed. The outside may be sided or it may be roughcast, and the inside may be "furred," and have 1 x 2 inch strips nailed vertically 26 inches from centres, and be lathed and plastered in the usual manner. A second method is to build solid brickwork between the studs three feet high from the sills, or fill it up that high with concrete. Strip the studs vertically on the sides wifh 1 x 2 inch strips, lath on the strips and plaster in between the studs. Board inside and out, and cover with paper, and finish same as in previous method. For a third method, sheath the studs inside and out with inch boards; cover outside with heavy dark canvas, painted one heavy coat of lead and linseed oil. Before inside sheathing is put on, cover the sides of the studding and the back of the outside sheathing with tarred felt paper, starting on face of stud, thence on side of stud along the sheathing, out on side of stud around the face, and so on, in and out, forming a perfect air chamber; put a lath on all joints, which must be vertical and close. Prepare the first floor and ceiling joists in any of the methods described for preparing the floors, and if the work is well done, the building will be as warm as the best brick house in winter, and as cool as any stone building in summer. In the construction of the roofs, well tarred paper under the shingles, and lath and plaster between the rafters, right up to the ridge, then rough board under the rafters, nail on paper, then lath and plaster as usual. Do not bring windows close to the floor, and see that all the joints around window and door frames are made close and tight. When using felt paper see that the laps are perfect around all frames and openings and that all joints are well nailed close. The warmth of a house depends very much upon the care taken in fitting everything about window and door frames close and tight, and having the paper carefully "tucked" into and around all angles.

About Flashings.

In most specifications there is inserted a clause which says: "All necessary flashings must be put on in the best manner," but other details are generally omitted, and the metal worker or carpenter generally put on such flashing as they think are "necessary," and the matter generally ends there, until the roof commences to leak and then there is trouble and extra expense which the owner has to pay. Often, even the material to be used is not specified, and the contractor, as a matter of course, makes use of the cheapest material he can employ so that it will cover the "necessary" clause in the specifications. The very best material for flashings is copper, as it is almost literally indestructible, but, copper flashings are costly, and therefore cannot be employed only in the most costly buildings. Lead makes excellent flashings and it is so pliable that it may be bent to almost any shape without injury. Zinc also makes good flashings, and may be used altogether for flashing hips and valleys. For valleys, the zinc should be made in one piece the whole length of the valley, and should never be less than sixteen inches wide. It should be soldered at the joints, and tacked to the roof boards at its edges, at long distances apart. In some cases, however, it is best to put the zinc in three or four pieces, if the valley is very long, as the expansion and contraction of the metal, if very long, will be apt to break the flashings from the nails, and tear away from the solder at the joints. Where the joints are not soldered there should be a good long "lap" in order to prevent water from backing up and causing a leak. Long strips of flashing should not be used when the flashing is being done against a brick wall, where the edge of the flashing is bent over to be tucked into a reglet groove or "raggle" which is cut in the stone or brickwork of the wall six or more inches above the slope to the roof, and parallel with it. The efficiency of this kind of flashing depends altogether on the care with which it is done. The effect of heat and cold alternately on such a flashing is to warp it until it springs out of the "raggle" either at one end or in the middle, letting a stream of water run down into the rooms below, and this can only be prevented by cutting the groove quite deep, an inch or so, instead of the half inch that is common, turning in the flashing to the bottom of the groove, and wedging it in firmly with slate chips and Portland cement. The wooden chips

generally used for this purpose soon shrink and become loose or rot away in a few years. In putting in "stepped flashings" there is really no necessity for cutting in a "raggle," or even raking out the mortar from the joints, if the flashings are built in the wall as the work progresses; but if the brickwork is all up before the flashing is done, then it will be necessary to rake out the mortar joints, insert the flashings in the joints one above another, lapping over each other like a flight of steps. This is a good way to insert the flashing, but not as permanent or as effective as building in the wall. The vertical joints lapping over each other will be apt to belly out some, and that will admit of wind and rain getting in between the flashings, and this defect should be remedied by being filled in with some sort of elastic cement or stopping made of "paint skins" and fine sand. When zinc is used for flashings of this kind, the metal should not be less than No. 13, sixteen ounce zinc. Tin and galvanized iron are both used for flashings, both in valleys and about chimneys and towers, and answers fairly well, but in a first class building it is always better to employ copper, lead or zinc. The question of flashing is a very important one, as the life of a roof often depends much on the efficiency of this work and the quality of the materials employed in the operation.

How to Describe an Arc where the Centre is Inaccessible.

It frequently happens that a segment of a circle has to be described, where the diameter is so great that the centre of the circle of which the segment forms a part, cannot be reached; and if it could, it would be impossible to make use of it in describing the curve required. In order to meet a condition of this sort, the following method, which has been found adequate for the purpose, is submitted: Suppose, for example, A B, Fig 1, to be the span or chord of the segment, and O O the rise.

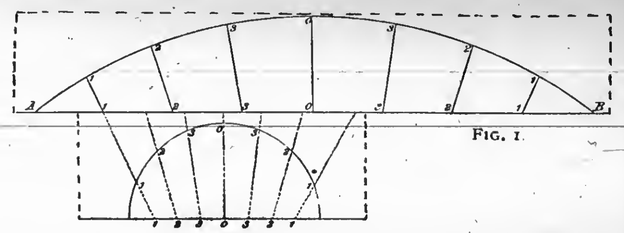


FIG. 1.

FIG. 2.

METHOD OF DESCRIBING A LARGE SEGMENT FOR CENTRES OR SIMILAR WORK.

Prepare a piece of stuff as shown at Fig. 2, and describe on it a semi-circle with the radius O O, of Fig. 1., which is the rise of the arc. Set off from each side of O O, on Fig. 2, any number of equal parts, say four; and in like manner set off four equal parts on each side of O, on the chord or base line of Fig. 2; join the parts on base and circle lines as shown on at 1 1, 2 2, 3 3, on Fig. 2. These lines are extended to the upper edge of board. Now come to the chord A B, and set off on right and left of O, four equal parts, bring upper edge of board Fig. 2 against the chord A B; make line 1, through semi-circle, come opposite point 1, on chord A B, as shown; extend the line by a straight edge and make distance 1, 1, on Fig. 1, equal to the distance 1, 1, on Fig. 2. Now move the board until the line 2, 2, on Fig. 2, is opposite to 2, on the chord line of Fig. 1, then draw line 2, 2, on Fig. 2, in the same direction through the chord, and make 2, 2, in Fig. 1, the same length as 2, 2, in Fig. 2. Slide the board along in like manner to 3 on the chord line and mark line on the same angle as line on 3, 3, Fig. 2; and make the line 3, 3, on Fig. 1, the same length as the line 3, 3, on Fig. 2. O O in both figures will be at right angles with the chord line A B, and the distances will be equal. The points 1, 2, 3, 0, etc., will be the points through which the curve of the segment will pass. Nails may be driven in the points found, and used as guides against which a thin strip of wood or metal may be bent in order to get the correct curve. The more divisions there are made in the semi-circle, the more nearly true will be the segment. The method is simple and perfectly reliable for either large or small curves. The principle is based on a very interesting problem in geometry.

ENAMEL-LIKE BLACK COATING FOR METALS.

It has been frequently tried to provide metals, especially steel and iron, with lacquered, bright coatings, but most attempts have been unsuccessful, since the lacquer covering did not possess the necessary elasticity and cracked off, says a Continental exchange. L. Sena now publishes a very simple and inexpensive process to provide metals, especially iron, with such a coating, which will neither peel off nor smell or stick in lacquering, but which can be applied so evenly, since no brush is used, that it may be styled enamel-like.

To produce the coating proceed as follows: Cover the bottom of a cylindrical pot with coal dust; 3 centimeters higher lay in a grate and now fill up the remaining space of the pot with the articles which are to be given the coating. Next close up the pot with a fitting cover and place it on a high fire below a well drawing flue. At first only the moisture contained in the coal evaporates, but soon charring commences, and light brown fumes escape, which excite to coughing. After the bottom of the vessel has been subjected to an incipient red-heat for one-quarter of an hour, whereby the enclosed articles are at the same time exposed to a rather high temperature, the carbonization is finished. The pot is now removed from the fire, and after about ten minutes the lid is taken off to let the fumes eseape from the objects. The latter are now all covered with a bright black coating of high elasticity and great uniformity. The simplicity of the process and the practicability of its application for a large number of cast iron goods promise quite an extensive employment of the method.

CAST IRON PIPE.—Cast iron was known to Holland in the thirteenth century and stoves were cast at Elass in 1400. But tradition has it, which an ancient Roman writer records, that the temple of the "Great Mother," at Sparta, is said to have been built by Theodorus, who first discovered the art of casting and making statues in iron. As with the metal itself, so its discovery in the form of cast iron was an accident which occurred at one of the early works in the Rhine provinces, where a part of the "running" one day was found to be of different texture, and it was a problem for some time what to do with the strange stuff.

VANCOUVER BUILDERS' EXCHANGE.

VANCOUVER, B.C., July 10th, 1899.

To the Editor of the CANADIAN ARCHITECT AND BUILDER:

DEAR SIR,—In answer to your enquiry for information concerning the Vancouver Builders' Exchange, I would say that early in the year a number of the builders met at the Hotel Vancouver to discuss the question of organization. We decided that in these days of trusts, unions, and combinations, organization was necessary in order that we might hold our own and keep abreast of the times. In the ARCHITECT AND BUILDER and other trade journals, we noticed that in almost all progressive cities in Eastern Canada and the United States the builders had some kind of an association, and that in promoting their interests, securing privileges and defending their rights, they were succeeding to an extent which, as individuals, would be impossible.

The different classes with whom we as builders do business—the laborers, mechanics, merchants, and in some cases the architects—have these unions and associations, which are equally successful. As contractors, we found that we were hedged in by many protections for other people. First, there are the contract drawings and specifications; next, the superintendence of the architect and clerk of works; then trades' union rules, city by-laws, employers' liability act, etc., etc., with penalties of all sorts to protect everybody from the builder. These things are right and proper to a certain limit, but there is a contractor's side to the business. Often he is obliged to submit to an injustice, because, single handed, he is unable to cope with the difficulties which meet him so frequently.

Taking these facts into consideration, we decided that the necessity for organization was imperative. We appointed a committee to prepare a constitution, rules and by-laws, and notified all the other principal contractors, asking them to join us in organizing an Exchange.

The objects of the association are:

1st. To provide a headquarters where all interested in the building business may meet, transact their business with dispatch and cultivate at all times a feeling of mutual interest and good will. With this end in view, rooms have been taken in the Fairfield block, opposite the post office, in the financial centre of the city, at the junction of the principal car lines and convenient to the architects' offices. We are fitting up our rooms with reading and correspondence tables, telephone and other conveniences so that our members will find our rooms a sort of general bureau of information. From 11.30 a.m. to 12.30 has been fixed as 'change hour.

2nd. To provide for the settlement of disputes of all kinds by arbitration whenever possible, and in other ways to lessen the friction between employer and employee, so that disastrous strikes and lockouts may be avoided.

3rd. To secure the adoption of the "uniform contract" such as is in general use in the United States, in which the conditions are as fair and just for the one as for the other of the parties concerned.

4th. To prevent competition between builders and architects. We have less of this in our city than there is in many others, and we believe that it is to the interest of both and also of the owners that there should be none whatever.

5th. To secure legislation which will render the business of the building contractors less precarious, and to use all legitimate means within our power, as an organization, to further our best interests.

There are rumors afloat to the effect that the Exchange, by resorting to questionable methods, will attempt to limit competition or secure a corner on the building business. We are aware that other Exchanges have made attempts in this direction, but the public may rest assured that the members of our Exchange are too shrewd to adopt any such short-sighted policy.

Our membership fee, as you will observe by the constitution which I enclose, is higher than in many similar organizations. This, and possibly some of our other regulations, may render it difficult for the irresponsible contractor to do business in Vancouver. We consider that we are quite justified in limiting competition to this extent, and that no one will suffer thereby. Any man, however, be he white or black, who can show our membership committee that he is prepared to do a legitimate business, may become a member of the Exchange by paying the same fee as has been paid by the original members. Should he become dissatisfied, or for any reason wish to withdraw, he may do so and receive back his membership fee, less 10 per cent.

The dealers in builders' supplies have recognized us favorably; they, as well as the sub-contractors and tradesmen, are joining as associate members, and are entitled to representation on the Exchange Board.

We have carefully considered the by-laws and rules of similar organizations, and in adopting ours we have tried to avoid the snags upon which others have come to grief. Our Exchange, we hope and expect, will be a permanent institution.

Thanking you for your kind interest and best wishes.

Yours respectfully,

A. E. CARTER,

Secretary Vancouver Builders' Exchange.

MASTER PLUMBERS OF CANADA.

Fourth Annual Convention of the National Association.

On Friday, June 30th, the members of the National Association of Master Plumbers, Gas, Steam and Hot Water Fitters of Canada assembled in convention in the city of Ottawa, the place of meeting being the Victoria Hall. The convention opened at 2:35 p. m., with Mr. Wm. Smith, president of the association, in the chair, and the roll call showed the following members present:

Toronto—Joseph Wright, W. Mansell, W. H. Meredith, James H. Wilson, and A. Fiddes.

Montreal—P. C. Ogilvie, J. W. Harris, John Watson and Joseph Montpetit.

Ottawa—E. B. Butterworth, H. A. Knox, F. G. Johnson, G. Julin, H. Normand, H. Foisy, H. Brown, G. Walsh, John McKinley, Peter Racine, and John Higman.

London—W. Smith and J. W. Chambers.

Halifax—Frank Powers.

A letter was read from the manager of the Starr Iron Company, of Montreal, regretting his inability to be present at the convention, and expressing assurance of a continuance of friendly relations with the master plumbers.

The president appointed Messrs. John Higman, J. W. Harris and J. H. Wilson to act as a Committee on Resolutions, after which the president, Mr. Smith, read the following address:

PRESIDENT'S ADDRESS.

It gives me great pleasure to welcome you to this our annual convention, which, I trust, will prove interesting and beneficial to all. While there has been no marked improvement in the condition of business or trade during the past year, our association has not suffered from the lack of increased membership. Those admitted to membership during the past year coming from all over the Dominion, show that the interest manifested in advancing this, our chosen profession, is not local but universal. No special effort has been made to increase the membership of our association. The majority of the applicants have solicited the honor, which would indicate a recognition of the standing of the association and the necessity for a united action to elevate and advance our profession. Our association has already been the means of accomplishing much good in diffusing a knowledge of the requirements for and the best methods employed in securing good plumbing, heating and ventilation, yet what has been accomplished sinks into significance when compared with the possibilities of an association like ours, with a membership embracing the leading men in the profession in all sections of the Dominion. A united effort on the part of each individual of our association will in time awaken the people and the Government to the fact that good plumbing, heating and ventilation are necessities and not luxuries, and will secure for us the same recognition and legislation that is accorded to other professions. And to accomplish the greatest amount of good to ourselves and to others, it is desirable that we should avail ourselves of every opportunity to advance the interests of this association, and that, in electing officers and appointing committees, we should select those who can best fill the different positions and who are willing to devote a reasonable amount of time to the affairs of the association. We should also endeavor to increase our membership by securing as members all who are eligible for such membership. This can be best accomplished by the individual members in the different sections of the Dominion where they are located.

There can be no more important question before the National body than the purpose it should serve in its relation to its membership. With this question successfully answered the duty of each individual member is plain. When men decide to co-operate, when they agree to harmonize social or commercial interests, the very first thought is what valid excuse have we to offer for such an association? Is the object or purpose praiseworthy? Is it necessary to better social relations or business interests, as the case may be? Is there a principle of right involved which we can use as a basis of organization, and which the great public at large must respect? These are the thoughts which must come to men who found organizations based on social or mutual interests. I believe that the true purpose of an association of master plumbers should be as follows:

1. To advance the cause of scientific sanitation. Why? Because plumbing and house-drainage are its most important department.

2. Its special object should be, therefore, a sanitary law which provides for the examination and registration of plumbing labor, and honest inspection. To secure such a law, public prejudice or ignorance must be overcome. To do this there must be a plan formulated for the education of the people. To educate members, a pleasant association room in each city is essential. The room should be provided with maps,

charts, blackboards. The library should consist of the latest scientific journals on house plumbing, drainage and ventilation, and there should be kept on file at all times trade literature for ready reference. To educate the people to realize the necessity of a plumbing law all literature should be issued by the association and distributed by its members to their customers and friends.

3. The chief object of the association should be to place the supply trade and the retail trade on a basis of mutual interest. Their interests are identical, and there should be hearty cooperation. And in my mind there seems no good reason why this cannot be accomplished if right methods prevail.

To this end we must enlarge our membership and improve the commercial credit of our members through open, honorable and cooperative business methods. When we build an association attractive enough to secure 95 per cent. of the purchasing power and reduce the risk of selling materials in our own ranks, we will command absolute trade protection without question, and, what is more desirable, respect. To overcome public suspicion and prejudice, we must by these methods improve the character of plumbing work. There is no surer way to win the respect and confidence of the people than to reduce the death rate of cities and the expense of sickness, which is the result of, I might say, criminal sanitary neglect. An association of plumbers built upon the above broad lines would become speedily a powerful factor in the country's best progress. Following out such a purpose, our annual gathering would become the occasion for scientific discussions and debates of great importance. Here, for instance, we have met in the city of Ottawa, which has, no doubt, been looking forward for months to this convention of master plumbers, believing that the deliberations of this convention will bring to them valuable information, aid and encouragement. What a disappointment it would be should we, as an association, organized to serve the purposes enumerated, fail!

Gentlemen, we make a sad mistake when we, as an association of master plumbers, refuse to interest ourselves in the great sanitary problems of the day. We must be spirited and elevate ourselves. I believe the greatest honor that can be bestowed upon a master plumber is to be a delegate to this convention. I believe the plumbing industry is of more importance to the population than all the doctors, for the simple reason that the doctors try to kill the germ after it has been bred, while the plumber abolishes the pest hole that starts the life and gives it a chance to exist. For that reason I think that all master plumbers should protect their interests in every detail.

In conclusion, I trust that you will pardon me for the many suggestions I have made instead of a complete resume of the work accomplished by us during my term of office. In my opinion it is better that the work we have accomplised should be given in detail by the different vice-presidents and members, particularly when it is already pretty well known by all present.

The recommendations in the president's address were referred to the Committee on Resolutions for consideration.

REPORT OF THE EXECUTIVE COMMITTEE.

The Executive Committee presented the following report, which was also referred to the Committee on Resolutions:

Your committee have pleasure in submitting their annual report to the fourth annual convention, for the year ending June 30, 1899. Two meetings of the executive have been held as a whole during the year, the first taking place on the steamer returning from Quebec, July 1, 1898, and the second being held in the city of Ottawa on June 30 of this year. At the meeting on July 1, 1898, the first business of importance was the appointment of a sub-executive committee, which resulted as follows: William Smith, London; E. R. Russell, London; W. H. Heard, London. The question of issuing a monthly Bulletin and employing a paid secretary was also discussed, but definite action in relation to the same was left over for a future meeting. Subsequently, these matters, with several others, were taken up by the sub-executive, and dealt with as was deemed best in the interests of the association.

The publishing of The Bulletin was entered into by the sub-committee, a separate report of which will be presented by the editor.

Our president has been indefatigable in his efforts to organize branch associations in other towns and cities, the result of which he has already told you in his report. At the same time, we regret that much more work must still be done in this direction, and we feel more and more assured that this cannot be thoroughly accomplished without a permanently-employed organizing agent, and, as in our report of last year, we again urge the great necessity of specially considering this question at the present convention. We have pleasure in reporting that several differences which arose between some of our branch associations and the supply men were carefully gone into by the sub-executive in conference with the officers and members of the Dominion Supply Association, in the presence of the complainants, last April, and were adjusted to the satisfaction of all parties concerned.

List in Accord.—The official Bulletin has contained the full list of manufacturers and dealers who are in accord, and whenever changes were reported to National headquarters they were made and announced in the issue following the notice. During the past year we have taken from the list 11 names, for various reasons.

Official Bulletin.—The editor's report will give full information as to the success of The Bulletin, which was launched on its trial trip in November last.

Re Secretary.—You will remember that, at the Quebec convention, the question of a permanent secretary was discussed, but no definite appointment having been made, Mr. Mansell was asked, and, after great pressure, consented to act again as secretary, but only pro tem., and until such time as the office could be filled permanently. At the first opportunity, your committee looked around for a suitable man to relieve Mr. Mansell. It had been intimated that Mr. W. H. Heard, of London, was willing to act, and he was accordingly chosen, but declined. Mr. E. R. Russell, of London, was also suggested, but he declined. Before reaching this stage of affairs several weeks had elapsed, and Mr. Mansell continued as secretary pro tem., and up to the present time he has done so, while Mr. Beel has performed the duties of the office.

SECRETARY'S REPORT.

The secretary, Mr. W. Mansell, submitted his report for the year, which was as follows:

In making this report I would first of all say that I did not anticipate twelve months ago to again have to make a Secretary's report, as I was only elected to the office pro tem., and fully expected at the time that a secretary would be chosen soon after the Quebec convention. But the year has rolled by without such a change being consummated—two names, however, having been brought by the president before the sub-executive successively, and elected, and each of them ultimately declining to act, for good reasons presumably.

Under these circumstances, though I have nominally held the office, I have not found the same responsibility resting upon me as I otherwise would, and, as I forewarned the convention last year, the clerical part of the work has been done by someone else, viz., Mr. Beel, as it was utterly impossible for me to attend to the duties.

Re Bulletin—This is a new departure in our work; it has been successfully floated, but, like any other new venture, requires all the support and care possible, and I regret that the members of the association have not made as much use of the Bulletin as they might have done. Members, and particularly secretaries of local associations, have in the Bulletin a splendid medium for keeping headquarters better informed from time to time as to the working and progress of the association in their particular vicinity, and I am sure the editor would be only too pleased to hear from any member upon matters of interest to all concerned.

Upon motion of Mr. Meredith, seconded by Mr. Wright, a unanimous vote of thanks was tendered to the secretary for the attention given to the affairs of the association during the year.

REPORT OF APPRENTICE COMMITTEE.

The following report was then submitted by the Apprentice Committee, it being likewise referred to the Committee on Resolutions:

Your committee, having during the past year given the apprentice question earnest consideration, respectfully report that in their opinion apprentices, in the old acceptance of the term, no longer exist in connection with our trade, and that our trade is in this respect no exception from other trades and mechanical callings. As a rule boys are no longer indentured to masters for a term of years, and masters no longer feel any serious obligation in the matter of imparting a knowledge of their calling to the boys who are constantly passing through their shops, staying a longer or shorter period as may suit the convenience of either. The boy remains in the shop if it suits his convenience, and the master keeps him for a similar reason. True it is that in many shops boys remain to become men, but there is no regularity or any recognized rule or law in the trade governing the matter.

The results are deplorable. A class of men are growing up without thorough training in the theory and practice of one of the most important businesses, dealing, as it does, with the most valuable asset of any community (its health). Modern methods have brought about this state of affairs, and without any remedy as yet having been evolved. Years ago the different kinds of goods and fixtures required were made in the plumber's shop. Stocks were piled up during the slack season to be used when the rush came on. To-day the factory, the prison and the asylum do the work, and both man and boy are idle when outside work ceases to be pressing. The master plumbers and other interested in the welfare of the community and in the trade have endeavored to overcome the difficulty through the agency and with the assistance of the trade school. In the Dominion, as far as your committee is aware, there is only one plumbing school. That is in Montreal, and it is in connection with the Council of Arts and Manufactures carried on under the auspices of the Government of the Province of Quebec. This school was begun some years ago, through the efforts of the Montreal Plumbers' Association. Although it has done good work, it is yet far from being efficient, and we regret to say that there is a lack of interest in the matter. Your committee fails to see why the mechanic should not be as anxious to control the class of men who are to follow the trades as are the learned professions. The clergy, the lawyers, the doctors, the engineers, the architects, the druggists, etc., have all definitely defined rules as to the class of men (their studies and their qualifications) who are to enter and practice their professions. Why in this mechanical age the mechanic should be content to follow up a go-as-you-please policy and fail to follow up and take the precaution our forefathers found necessary is more than your committee can understand. An earnest agitation for the founding of mechanical colleges could not fail to be beneficial. It is certainly as necessary from the public health point of view that some care and attention should be given to the education and training of the plumbers as well as the doctor.

Your committee would suggest that, with a view to insuring young men putting in a certain amount of time regularly in the practice of the trade before claiming to be journeymen, that a printed form of discharge be issued by our association, stating that the bearer, besides having the necessary character qualifications, should be entitled to admission into another shop. Should he be discharged before fulfilling the full time allowed (say five years), his next employer should endorse on his certificate the time he put in with him, and so on until the certificate showed that the holder had worked as a helper or apprentice the number of years that may be decided upon as necessary. It would, of course, be necessary that no master take a lad from another shop unless he was possessed of a properly filled up certificate of discharge.

Further, the plumbing and health by-laws of all cities and towns should contain a clause forbidding the practice of the trade by any journeyman unless he could show a certificate or pass a theoretical and practical examination proving his knowledge of the business.

In conclusion, we would urge upon our association the importance of this subject, and that it should at once put the matter in practical working order. Anything insuring regularity would be a vast gain on the present lax methods.

[Signed] JOSEPH LAMARCHE.
J. W. HUGHES.
JOHN MOLL.
P. J. CARROLL.
JOHN WATSON.

THE OTTAWA ASSOCIATION.

The Ottawa Association, through its secretary, Mr. H. A. Knox, reported as follows:

I am happy to report that the local branch is one of the soundest in the country. We have black sheep, but they are not allowed to hinder us in the least. Our objects are too important to be forsaken because of the inattention of a few. Those whose minds are weakened by individual competition are neither desirable nor worthy men to strengthen the bonds of organization. We have tried to stimulate and strengthen their intellectual power; but, alas! we found them incurable, and our attention is now directed to men who know their opportunities.

We are stronger than last year, by the addition of two members. Consequently we have more representation at the convention.

The evils we have to contend with vary: By-Law No. 1358 of this municipality, for regulating plumbing and inspection, is not enforced, because no inspector exists, uniformity is displaced by confusion, etc., and the results are disastrous all round. The carpenter, the bricklayer and the householder has each his own standard of what is good and what is bad in sanitary and plumbing work. The plumber is not, in many cases, accepted as an authority on his work. The architects, too, are deprived of their just heritage owing to weakness and apathy. What we need badly is the operation of the by-law. Intelligent, skilful and alert workers will then be brought into the ranks. More discrimination ought also to be exercised in selecting boys for the trade.

In our humble opinion, if the reforms we are seeking were sought for by other locals, the association would be a moral, intellectual and financial giant.

H. A. KNOX, Secretary.

On motion of Mr. Harris the report was adopted.

A report by Mr. Beal, regarding the publication of an official bulletin, was submitted. It stated that the first issue appeared in November, 1898, and that the entire expenses of publishing the journal had been covered by receipts from advertisements. After the experience of the past eight months, however, it was evident that in order to continue its publication some financial assistance from the association would be necessary.

REPORT OF THE VICE-PRESIDENT.

Mr. J. W. Harris, of Montreal, vice-president of the Association, submitted the following report:

One year has already gone since I had the honor to be elected vice-president of your association. In submitting this report to your consideration, I will confine myself to a few suggestions which I think will be of general interest, and more especially the following:

I may state, in the first place, that, although the dealings of this association with manufacturers and jobbers during the past year have not been as satisfactory as we would like to see them, I am glad to say that the feeling between us and them is growing better every day.

There are many things to be done yet to better our situation with manufacturers and jobbers, things that I could not mention in this report, but would suggest that a special committee of three be appointed by this association, with full power to confer with a committee of manufacturers and jobbers on any subject that may be of interest to our association, or both associations. That committee should meet at least every three months and make a report of their doings after each meeting to the executive committee.

There is another feeling which I would like to see in existence in our association, that is to have all the members who belong to our society taking an active part in its doings and treating association matters as they would treat their own. Let us look at each other as good neighbors do, and then, instead of losing a year or two in going to Klondyke for gold, we will find good money within a few steps of our door. For that purpose, let us stand to each other and have good members. Then will be the time for us to publish in the papers that we have discovered a gold mine which will benefit the public at large as well as the plumbers.

Report referred to Committee on Resolutions.

REPORT FOR PROVINCE OF NOVA SCOTIA.

A report by Mr. Geo. H. Perrier, vice-president representing Nova Scotia, was then presented, as follows:

As your annual convention is near at hand, and, as you appointed me vice-president for Nova Scotia, I think it will be necessary for me to report upon the work done during the past year in our section of the country.

In the first place, I might say that our local association, which takes in Prince Edward Island, is in very good form. The majority of the members take an active interest in the good work, which, as you know, is half the battle. We have about twenty-six members in good standing, which I think is very good for Halifax and vicinity.

There is another matter I would like to say a word about, and that is that we do not receive encouragement from headquarters. An occasional letter from the heads of our Dominion Association would let us know that we are not simply local, but that we are a part of the Dominion Association and backed by men that are ready to stand by us in any reasonable cause.

I see by the report of our last meeting, held in Quebec, that the committee appointed to consider the question of appointing a permanent secretary reported in favor of engaging one, which I think would be a move in the right direction, for I consider the work in connection with association matters takes up so much of our secretary's time that he should be paid for it.

In conclusion, gentlemen, I must express my regret in not being able to attend the convention, but wish it every success.

GEORGE H. PERRIER.

The president, referring to the statement by Mr. Perrier that the eastern associations did not receive encouragement from headquarters, replied that he had written a number of letters, but to many of them no replies had been received. After some further discussion the report was received and referred to the Committee on Resolutions. Messrs. Joseph Wright, J. W. Chambers and E. B. Butterworth were appointed auditors, after which Mr. John Higman, vice-president for Ontario, presented the following report:

As vice-president for Ontario, I beg respectfully to submit my report for the year ending June 30, 1899. During my term of office, I have written several master plumbers in the cities and towns of the eastern part of the province, doing my best to induce them to join the nearest local association, with great hopes, in many cases, of their doing so, or of forming local associations where three or four master plumbers are established. But it is a great surprise to me that so many bright and intelligent master plumbers still hold back from joining the association, when it is so evident that, if we wish to attain the high position we are entitled to, every master plumber should join the association.

The members of the Ottawa association are doing their best to help the good cause along. This year we tried to get the city council to pass a plumbing by-law, with the hope of having a plumbing inspector appointed, but did not succeed at the time, but hope to in the near future. In fact, a plumbing inspector is badly needed in Ottawa, in the interest of the public health and for raising the standard of the plumbing trade generally.

We have had two cases of wholesale firms selling to consumers here in Ottawa, which were referred to the executive to deal with, which had the desired effect.

In conclusion, I take great pleasure in thanking the officers and members of the Master Plumbers' Association for their uniform kindness during my term of office. (Signed) John Hyman.

The secretary then read the following resolution of condolence, which, on motion of Messrs. Wright and Powers, was concurred in:

Whereas,—It having been reported to this convention that, since our last annual gathering, two of our most active members, viz., W. H. Briggs and J. Horton, both of Montreal, have passed away from the scene of their labors, therefore, be it

Resolved,—That, in the death of those comrades and friends, we have lost two of our truest and hardest-working members. How much they contributed to the prosperity of the association will probably never be known, but the kindly and devoted interest they took in all matters connected with the trade will not soon be forgotten by their wide circle of friends.

Resolved,—That the delegates of this convention sympathize with the families and friends of our late confreres in their bereavement, believing that "He that doeth all things well" will console them in their time of distress.

Resolved,—That these resolutions be inscribed in the proceedings of this convention, and that a copy thereof be forwarded by the secretary of the association to the families of the deceased.

Mr. Wright read a letter from Mr. W. J. Barr, of the Vancouver Association, requesting him to represent that association at the convention, and stating that the association was progressing steadily. A brief report was also read from Windsor association.

In reply to a question from Mr. Butterworth as to why Ottawa was not represented on last year's execu-

tive, Mr. Wright explained that in selecting the executive committee last year the idea was to have members who were near each other, in order to curtail the travelling expenses.

REPORT OF COMMITTEE ON RESOLUTIONS.

Mr. Harris presented the following report of the Committee on Resolutions:

Your Committee on Resolutions beg leave to report as follows:

1. The executive committee, in our opinion, has done its best during the past year to bring business to a good result, and we would urge the members to continue their good assistance to them.

2. Regarding the president's report, we recommend the members to follow as much as possible the very wise advice given in that very elaborate and intelligent document, for which we recommend a hearty vote of thanks.

3. In regard to the report of the vice-president, we recommend, as suggested in his report, that a committee of three be appointed, two from Montreal and one from Toronto, with full power to meet with a committee of manufacturers and jobbers to treat on any subject that may be of interest to both associations.

4. In connection with the secretary's report, we beg to concur in the hearty vote of thanks to him, and recommend the adoption of his report.

5. In regard to the report of the committee on apprenticeship, we beg to state that we fully agree with all its contents, and would recommend its adoption at this convention.

6. Re. Bulletin report, we beg to confirm the motion which was passed at the executive meeting this morning, which left it in the hands of the executive for further consideration.

7. We recommend the adoption of the report of the vice-president for the province of Ontario.

8. By the report of George H. Perrin, for the Provinces of Nova Scotia and Prince Edward Island, we are pleased to see that they have succeeded in getting the jobbers to sell to members of their association only; we would recommend that all places which are in a similar position use their best endeavors to obtain the same. We recommend its adoption.

9. Regarding the secretary's report of the city of Ottawa association, we beg to confirm its adoption.

10. Re. the correspondence from the Starr Iron Co. to the Ottawa association in regard to the manufacturers forbidding its members to attend our convention, we strongly condemn their action, as their reasons for taking this action refer to the conduct of a few members, and it is unjust to treat this association as a body as they have done, particularly as a majority of the members of this National Association are quite ignorant of the facts in regard thereto.

J. W. HARRIS.
JOHN HIGMAN.
J. H. WILSON.

It was decided to take up the report seriatim, and, on motion of Messrs. Wright and Montpetit, the President's address and the report of Executive Committee were adopted.

The clause referring to the report of Vice-President Harris created a lengthy discussion. Mr. Harris explained that the object of the proposed committee was that they should be ready at all times to confer with representatives from the Dominion Association. Mr. Mansell could not see any difference between the committee proposed to be appointed and the sub-committee now existing for the purpose. The feeling seemed to be that the appointment of this special committee was unnecessary, and after this clause had been struck out, this portion of the report was adopted.

The Secretary's report was adopted without discussion.

The consideration of the report of the Apprentice Committee resulted in a discussion as to the competency of workmen. Mr. Harris stated that sometimes men asked for employment, claiming to have served ten years, when perhaps they had served only a few months, and it was only after they had destroyed material that their incompetency was discovered. Mr. Watson suggested that an apprenticeship agreement should be drawn up by the National Association. The report was adopted, as also were the reports in regard to the Bulletin and by the Vice-President for Ontario.

Some discussion arose as to the action of the Plumbers' Supply Association in resolving not to attend the convention of Master Plumbers, it being considered by some to be an insult to the members of the Association.

Mr. Meredith moved that clause 2 of article 3 of the Constitution be amended by inserting the following words: "Each said delegate to be known and designated vice-president of the province he represents." This makes the clause read as follows: "Its officers shall consist of a president, vice-president, financial and recording secretary, treasurer and executive committee. The executive shall consist of the president, vice-president, financial and recording secretary, treasurer, retiring president, and a delegate from each province represented in the Association, who shall be elected at the annual meeting, each said delegate to be known and designated vice-president of the province he represents. The president shall be chairman of the Executive Committee." The motion was carried.

The President outlined a scheme of reorganization with which he was in favor. He recommended that the plumbers in the different provinces of the Dominion should organize as separate associations, each provincial association having its convention, and at this convention electing a member to represent it in the Dominion Association. He pointed out that with the Executive Committee residing, say, in Toronto, it was difficult to adjust grievances in the Maritime provinces and in Manitoba and British Columbia. If the members were in favor of the proposition, he asked that a committee be appointed, preferably to consist of one member from each local association.

Mr. Ogilvie could not see any advantage in such a step, while Messrs. Mansell and Harris spoke in favor of the scheme. The latter pointed out that a thing which worked well in one province might not work well in another. He moved the appointment of a committee, consisting of Messrs. Smith, Marsell, Ogilvie and the mover, to consider the matter and report to the convention on the following morning. This was seconded and carried, after which the convention adjourned to meet at 8.30 a.m. on Saturday morning.

SECOND DAY.

Upon re-assembling on Saturday, the president appointed the following Nominating Committee: Mr. Wilson, Toronto; Mr. Watson, Montreal; Mr. Knox, Ottawa.

It was announced that representatives from some of the supply houses were, according to agreement, waiting in the ante room. The sergeant-at-arms then admitted the following gentlemen: Mr. J. Carlind, of the Ideal Manufacturing Co., Detroit; Mr. T. M. Stewart, of McAvity & Co., St. John, N.B.; Mr. McDougall, of James Smart Manufacturing Co., Brockville; Mr. Arthur Betton, of the James Morrison Brass Manufacturing Co., Toronto; Mr. Forbes, of W. Stairs, Son & Morrow, Halifax, and Mr. A. Saunders, of the Goderich Organ Co. Each of the above gentlemen made a few brief remarks, referring to the necessity of good feeling existing between the supply men and the plumbers, after which a vote of thanks was tendered to the gentlemen.

ELECTION OF OFFICERS.

The Nominating Committee presented their report, nominating for president Messrs. W. Smith and J. W. Harris. Mr. Smith voluntarily retiring, Mr. Harris was declared elected as president of the association. For vice-president, Mr. Wilson nominated Mr. W. Mansell, which nomination was approved by the convention. Mr. P. C. Ogilvie, of Montreal, was nominated for secretary and elected without opposition, while Mr. W. H. Meredith, of Toronto, was re-elected treasurer.

The Nominating Committee submitted the following names as provincial representatives on the Executive: Ontario, H. A. Knox, Ottawa; Manitoba, J. H. Wilson, Toronto; Quebec, John Watson, Montreal; British Columbia, Joseph Wright, Toronto. Mr. Powers, of Halifax, asked if the Maritime provinces should not be represented, whereupon Mr. Frank Powers was chosen to represent New Brunswick. On motion of Mr. Harris, seconded by Mr. Knox, the provincial representatives on the Executive Committee were declared elected vice-presidents for their respective provinces.

The treasurer, Mr. Meredith, presented his annual report, which showed receipts of $1,499.64 and expenditure of $1,329.20, leaving a balance of $170.44. He pointed out that the sum of $96.75 on account of the Bulletin was still due, also that $8 had been received from Winnipeg Association, making the total surplus $275 19. The report was adopted.

The special committee appointed on the previous day to report on the President's provincial association scheme, submitted their report, recommending that a committee be appointed to consider the formation of provincial associations, the said committee to report to the Executive Committee. The report was concurred in, and Messrs. W. Smith, J. W. Chambers, and E. R. Russell named as a committee to act in this connection.

Messrs. J. Wright, W. Mansell and W. H. Meredith were appointed a committee to report at the next convention upon the question of continuing the publication of the official bulletin.

It was unanimously decided that the next convention should be held in the city of Montreal, although Toronto and Halifax were also brought up for the consideration of the convention.

The report of the auditors, then presented, certified to the correctness of the treasurer's books. The new officers were then escorted to their respective positions, and the convention adjourned at 12.05 p.m.

THE BANQUET.

On the evening of June 30th a banquet was tendered the visiting delegates by the local association at the Grand Union Hotel. Mr. John Higman, president of the Ottawa Association, presided in a fitting manner. About forty guests sat at the tables and a most enjoyable evening was spent. Letters of regret were read from City Engineer Gilt, Assistant City Engineer Kerr, Medical Health Officer Robillard, Chief of Police Powell, Warden King & Son, Dominion Radiator Co., Toronto, H. MacLaren & Co., Montreal, H. R. Ives & Co., Montreal. The menu was elaborate and the after supper speeches brief and humorous. The various toasts were responded to as follows: "Her Majesty the Queen" by the singing of the National Anthem; "Our Guests, The National Plumbers and Visitors," by Messrs. Wm. Smith, J. W. Harris and W. H. Meredith; "The Mayor and Corporation," by Mayor Payment, Ald. Davis and ex-Ald. Hill, chairman of Board of Health; "The Supply Men of Canada," by Messrs. A. Saunders, of Goderich Organ Co., T. M. Stewart, of T. McAvity & Co., Wm. Grey, of James Robertson Co., and A. Betton, of James Morrison Mfg. Co.; "The Local Master Plumbers," by John Higman and E. B. Butterworth. Songs were contributed by Messrs. Wilson, Knox, Saunders, Stewart and Dundale, and a string band enlivened the proceedings.

MR. J. W. HARRIS.

Mr. J. W. Harris, president-elect of the National Association of Master Plumbers of Canada, is a member of the plumbing firm of Lessard & Harris, Craig street, Montreal. He was born in Buffalo, N.Y., in 1865, removed to Montreal when seven years old, thence to Chicago, where he

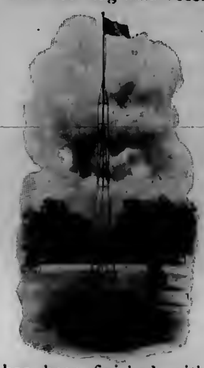
MR. J. W. HARRIS.

learned the plumbing and heating business. Returning to Montreal a few years later he became manager for Brodeur & Lessard. At the end of five years Brodeur retired, and Mr. Harris became a partner. He has invented and patented several useful devices, and a special system of ventilation for buildings, and is also a mechanical engineer.

What is said to be the largest sheet of glass ever blown was recently turned out at the Chambers Glass Factory, New Kensington, Pa. It measured 54 x 84 inches.

STEEL FLAG STAFFS.

The accompanying illustration represents a galvanized steel flag staff recently erected on the grounds of the Normal School at Ottawa. These staffs are made of steel angles and pipe, thoroughly galvanized. They are made for use on the tops of buildings as well as on lawns. Messrs. Goold, Shapley & Muir Co., of Brantford, Ont., are the manufacturers.



The walls of a Washington dining room are paneled their entire height with mahogany, the panels being small and square, perfectly flat, with a simple moulding surrounding them. The wood has been washed with weak lime water to darken its tone, and then has been finished with a dull gloss. The room is lighted from a skylight, which is centered over the table, and is filled with a fantastic tracery in opalescent glass, whose radiance is cast upon the white cloth and the glittering glass and china, lighting it up with gorgeous coloring. In the vertical space under the skylight is a series of panels, filled with a frieze of classic figures in low relief, tinted to give the effect of old ivory. The ceiling round the skylight is paneled like the side walls.

Clay Model of Portion of Terra Cotta Cornice, Brown Bros.' Warehouse. By W. J. HYNES, Gould Street, Toronto. BEAUMONT JARVIS, Architect.

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CONDITIONS IN THE HEATING TRADE.

The complaint is heard that, notwithstanding the considerable increase in prices of material entering into the construction of heating furnaces and apparatus, some of the manufacturers and dealers are still selling at about the same prices as last year. If this report is correct the policy of these manufacturers and dealers is certainly one to be condemned, inasmuch as it deprives of legitimate profits not only those who practice it, but also the other manufacturers and dealers in the trade who may be desirous of selling at a fair margin of profit. We know of some firms who, up to the present, have refrained from pushing sales at prevailing prices, because they admit of little or no profit. These firms are increasing their stock in the expectation that later on in the season there will come an advance in prices which will allow sales to be made at a profit. Some of these firms are manufacturing for stock purposes on a much larger scale than last year, and are confident of being able to dispose of the whole of their stock before the close of the year. A considerable business in heating apparatus is being done in the North West and British Columbia. Notwithstanding the mildness of the climate in the latter province many hot water plants are being sold and installed.

At least some of the manufacturers of heating apparatus learned well the lesson during the boom days in Toronto that it is unprofitable and altogether unwise to sell goods to persons of doubtful financial standing, and credits are being more and more restricted. This is a line of business policy which all who have the commercial welfare of the country at heart must approve of. The system under which American wholesale manufacturing companies limit credits to sixty days, must have the effect of shortening credits in this country also, as manufacturing firms who must pay for their goods within sixty days, cannot afford to sell to their customers at four months.

This restriction of credit, as well as other business regulations imposed by American manufacturers, must operate to the advantage of firms in this country doing business on a large scale, with ample capital, and conversely, to the disadvantage of the smaller class of traders. The extraordinary volume of trade which is now flowing into American manufacturers tends to make them unusually independent in their terms to customers. The formation of manufacturing trusts which control the market in different lines, has operated in the same direction. As an instance, the manufacturers of steel sheets have intimated recently that in future they will not pay freight charges except on orders of 30,000 pounds and upwards. The disadvantage to which the smaller firms will be subjected by this regulation is self-evident.

Speaking of this phase of the subject, it is learned that large profits have been made by wholesale jobbers who were able to pay spot cash for their goods, and who, foreseeing that prices of materials were almost certain to increase to a considerable degree, placed large orders for such goods with the mills, and are now reaping rich profits as a result of their ability to gauge future conditions, and also their financial ability to take advantage of the situation.

The High School Board of Toronto have appointed a committee to report to the board on the desirability of adding a course of manual training to the courses now provided in the Collegiate Institutes.

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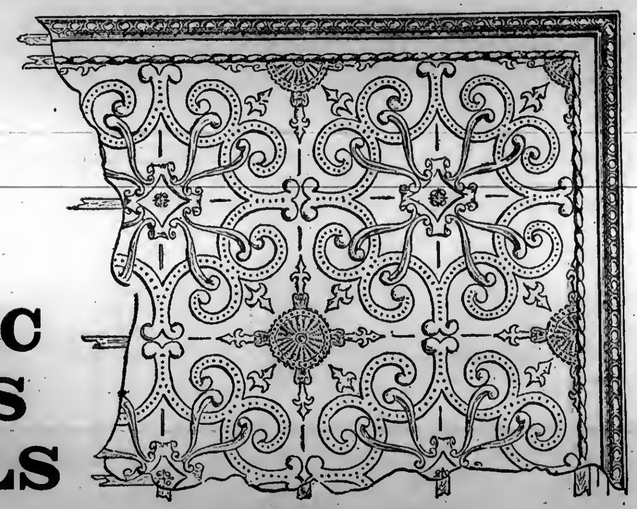

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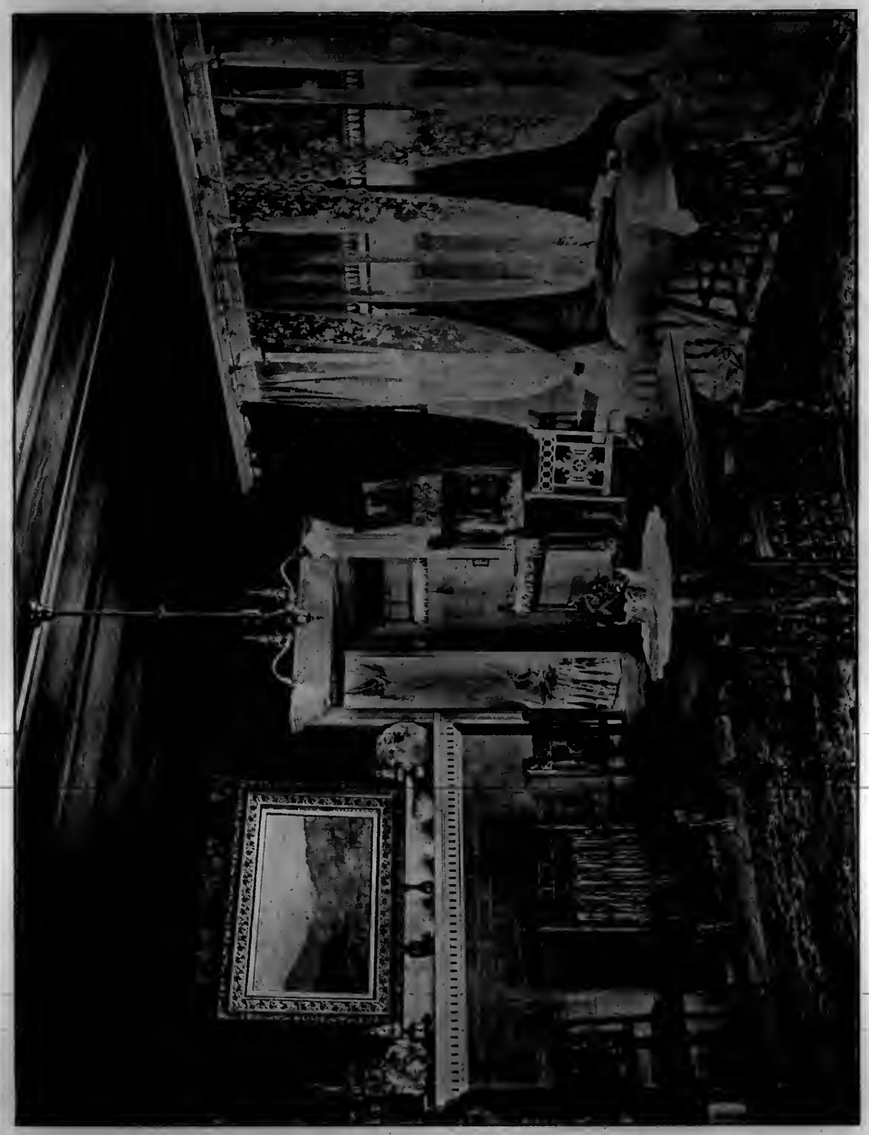

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HENRY SPROATT, ARCHITECT.

CANADIAN ARCHITECT AND BUILDER.

VOL. XII.—No. 8. AUGUST, 1899 { PRICE 20 CENTS. $2.00 PER YEAR.

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The C. H. MORTIMER PUBLISHING CO. of Toronto, Limited,
Publishers,
Confederation Life Building, . - TORONTO, CANADA.
Telephone 2362.

Branch Office: NEW YORK LIFE INSURANCE BUILDING, MONTREAL.
Bell Telephone 2299.

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The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to foreign subscribers is $2.50. Subscriptions are payable in advance. The Journal will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrears of subscription paid.

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Wire Glass in Fires.

A RECENT fire at the Armour glue works in Chicago appears to have shown that solid wire glass is an effective protection from fire. The Inland Architect says that the windows with metal frames and wire glass were subjected to a "fierce heat," but the flames could not make their way through, so that $400,000 worth of property ten feet from the flames was protected by glass.

Cataloguing Libraries.

AN important step is being taken in the direction of bringing into affiliation under one catalogue system several of the public and technical libraries of Montreal. The preparation of the catalogue is in the hands of Mr. Gould, librarian of McGill University. The card system will be employed. The management of the new public library at Westmount, a suburb of Montreal, wisely entrusted to Mr. Gould the selection and cataloguing of their books. Thereby the duplicating of books which are already included in McGill and other public libraries of the city has been avoided. The proposal has been made, and will doubtless be approved, that the Art Association, the Canadian Society of Civil Engineers, the Fraser Institute, the Province of Quebec Association of Architects, and perhaps other public bodies possessing libraries should arrange to have their collections catalogued by Mr. Gould in the manner described. With the catalogue

of their own library each of these bodies would be supplied with a copy or copies of a complete catalogue of the books contained in all the associated libraries, including lists of additional books when purchased. Under this system, duplication, and the useless expenditure incident thereto, would be abolished, while the members of the various societies thus affiliated would have at command the use of the books comprising the combined collection. The advantages of the system are so obvious as to make advisable its adoption in all cities where there has been established more than one public library.

American Institute of Architects.

At a meeting of the executive of the A. I. A. held in Washington on July 17th, a draft programme was adopted for the convention to be held in Pittsburgh, Pa., on November 13, 14 and 15, next. The papers to be read will be classed under several heads: relating to artistic subjects; to historical topics and to construction. Under the first head there will be several papers on the influence of the French School of Design on Architecture in the United States. One or two papers are promised on architecture and the allied arts. Several papers are expected on the legitimate style of ornamental design for skeleton steel construction, as well as a few papers on historical topics. The Pittsburgh manufacturing plants, such as the Carnegie steel works, the Westinghouse electrical plants and the plate glass works will be thrown open to the architects for examination, and before this examination papers will be read describing the methods of manufacture, &c., of the different plants that will be visited.

New Building By-law in Montreal.

A YEAR was spent by a Committee of the Province of Quebec Association of Architects in framing a new building by-law for Montreal. The result, in the form of a draft by-law, underwent further revision at the hands of a special committee of the City Council, the Builders' Exchange and other local associations whose interests would be specially affected thereby. Having by these been finally approved, it now requires but the sanction of the City Council, which will doubtless be given at an early date. Under the proposed by-law an architect would be placed at the head of the City Building Department, having as his subordinates men possessing a practical knowledge of modern building methods and requirements. In Montreal as in Toronto there is urgent need for a thorough revision of the present obsolete building regulations, and also for the reconstruction of the City Building Department in a manner to insure a more thorough and satisfactory compliance with proper constructional methods.

Professional Ethics.

IT is an unpleasant duty that an architect is sometimes called upon to perform, when he is commissioned to report on the work of another architect because the client is not satisfied. Most architects would prefer to decline with the reason that they do not care to interfere with the work of another architect, but it is self-evident that if one who is asked so to report declines some one else will be employed, and probably the man who feels like declining will be actuated by a less antagonistic and criticizing spirit than one who would be only too glad of the work. If professional ethics were worth more than the paper they are printed on the criticized architect would be willing enough to leave the matter in the hands of the architect who is to report on his work, knowing that full justice would be done him. But as it is, he may naturally fear that the opportunity thus put into the hands of another architect will result in his being torn to pieces without mercy. Under any circumstances the architect would prefer that the matter should be submitted to arbitration. A painful case of the kind has recently occurred in connection with the new Record Hall of New York. Mr. Thomas, the architect, had proposed a great deal of very costly work that the Mayor thought useless and extravagant considering the fact that the building was not for the use of the public but for the storage of books and documents. Mr. Thomas has been subjected to scathing articles in the New York papers and feels aggrieved that his artistic work is to be spoiled on account of economy. Since the city has to pay it would have been better had Mr. Thomas quietly submitted to the exclusion of such costly work as he proposed and been willing to modify his plans. As it is the Mayor requested Messrs. Horgan and Slattery to look into the matter, with a view to ascertaining if it was necessary to incur so great an expense. It is due to the profession, and in particular to Messrs. Horgan & Slattery that the true nature of their report should be given publicity, to counteract the biased statements of the daily press. Their work has been honorably carried out; they have not detracted in any way from the character and ability of Mr. Thomas or in the least contemplated the possibility of stepping into his shoes and getting the work away from him. Their report, in fact, is worthy the attention of all who may be called upon to report on another architect's work. The result is that Mr. Thomas has been ordered to make a modification of his designs whereby nearly a million dollars will be saved.

Contracts Between Architects and Clients.

ARCHITECTS would do well to turn their attention to the subject of contracts between themselves and their clients. It is a matter that architects' associations should take up in a more definite manner than they have done heretofore. Except in large undertakings, contracts are seldom drawn up; the custom of the profession seems to serve as an implied contract between the parties. So long as the architect's work is at its commencement expected to be completed within a year, a written contract is not required by law. A recent contract entered into by the corporation of Toronto and the architect for the market improvements contains one clause in particular that is hardly fair to the profession, if, as is likely, this contract will form a precedent. The clause is to the effect that the corporation shall have the power to dismiss the architect if in their opinion his work is not satisfactory. No doubt this clause, if occasion arose, would be governed by an arbitration clause. But the point is, that a client, having selected his architect, presupposes that he is capable of carrying out the work entrusted to him, and the idea of putting in a clause to enable the client to get rid of him must produce a feeling of uncertainty, with a bias against the architect. It happens in very many cases that a client who is prone to be suspicious believes his architect is not acting fairly towards him when he decides some matter in dispute between client and contractor in favor of the latter, and under a contract containing such a clause as the one in

question, the client would most naturally be inclined to act upon it, whereas, in the majority of cases, a client learns that his architect has done his duty fairly and squarely, and that had he gained his own point at the time an injustice would have been committed against the contractor. It is to be feared that an architect is more likely to be dismissed than not, for the simple reason that a suspicion may at any time arise in a client's mind against which it is impossible to guard. The clause must have the evil effect of making the architect of necessity favor his client at the expense of the contractor, rather than run the risk of ignominious dismissal. The architect's position is a peculiar one. He is his client's advisor, and he should not at the outset be threatened with dismissal in the event of his client objecting to his advice. Time enough to talk about dismissal when it becomes evident that the architect is failing to fulfil his part.

PRIZES FOR GOOD DESIGN.

The prizegiving by the municipality of Paris for the most beautiful houses of the year is established. There are to be six prizes given in the year. The architect gets the prize and the owner is exempted from one half his tax for local improvements. It is comparatively easy in Paris to make a fair decision about a question of design even when the matter is in the hands of the municipality. There is but one style of design; the canons are fixed, and in case of doubt there is authority to appeal to in the School of Fine Arts. But the great thing is that everybody regards a matter of art as a question deserving of serious consideration, and a decision in such a matter of genuine importance. What would be the fate of such a prize in the hands of the aldermen of an American or Canadian city. Among the list of applicants each would soon find someone whom he would like to help along; and would he be likely to stand in his way on the question of a little matter of appearance that is of no consequence? It is not want of honor we should have to complain of so much as want of appreciation of the merits of either the the building or the prize giving. Yet it is in these countries if anywhere that the giving of such prizes is needed. In Paris they have both fine examples of architecture of all periods, from which the naturally gifted may cultivate a sound taste, and also a standard style, which must materially reduce the difficulty of judgment on the point of excellence for the less gifted. It is here where we have no tradition, no standard and no prevailing excellence that just such distinction is wanted as is being given to good wor kin Paris. There it is a reward for excellence generally recognized and applauded. Here it would be a pointer to the public as to what is good work. It would not be at all surprising to find the decisions at first bewildering to the public and to those admirable critics the local reporters. The body which made the decisions would need the courage of their opinions. But, if the decisions were right there is no doubt that the stamp of approval put upon buildings by persons supposed to be able to judge of merit would attract to the buildings a questioning attention that they would not otherwise have received, with the certain result that their merits would grow upon the observer and in course of time the presence of the acknowledged good would drive out the bad. It is an unfortunate thing that it is not only the public who do not know, that want a standard, but architects who do know. It is a doctrine among some architects that the business of the designer is to suit the public taste. There is only one end to a career founded upon this error. But the first fruits are no doubt promising; and it may be sometimes hard to distinguish between rising to meet the client's needs and falling to meet his taste, under the idea that the man who pays should get what he wants. What he pays for is good advice and that is what he should get. It would be a stiffener to an uncertain mind of this sort to know that there is an instrument for establishing public opinion and a chance for his client to measure his house not by his own opinion but by authority.

The crux of a proposition of this kind is its feasibility. Who are to act as judges? Yet the idea is not altogether chimerical. What is practical politics in Paris ought not to be an impossibility to think of in other enlightened countries. And it is worth thinking about, for something to form a guide to public taste is much needed.

TREATMENT OF WOOD.

THE American Paper Trade announces on "the best inside authority" that "if the present price of spruce land is kept up, in five years from now there will not be a stick of timber standing in the United States." It concludes the article by saying "the cry of the manufacturers is 'On to Canada'." It is a pity that something cannot be done to stop the use of good building material to make a pulp for which trash is good enough. There is no doubt that, when the spruce is gone, American ingenuity will discover a substitute; the pity is that the need of a substitute will not be pressed upon them sooner. A price for our spruce that gives no reason to look about for a substitute is too low a price. Spruce has a value far above its value as pulp. It is not our best wood; but its destruction implies the destruction of pine, which, in the absence of spruce, must be wasted in inferior work for which spruce would do. The destruction of both pine and spruce is in progress.

To contemplate the exhaustion of the forests is to sing the praise of wood. There is nothing like it. It has strength and stiffness greater, as compared with weight, than any other material. It is more easily and quickly worked. It is a non-conductor—an excellent thing in these days. There is nothing that will resist fire, without losing its structural strength, so long as solid timber.

We cannot afford to waste so precious a material. To some extent its less extensive use is inevitable and the substitution of stone and iron will be an improvement in some ways. But we cannot dispense with wood, and its value will continue to increase as its abundance diminishes. With the increase of value comes increased care and science in its use. We read continually now of processes invented to preserve wood from decay. The usual way is by impregnation with a preservative. The Southern Pacific Railway treats piles 110 feet long, by evaporating the moisture at 230 degrees and filling its place by creosote at the same temperature. This process is said to be perfect. All microbes, bacilli and animalculae avoid creosote; and the teredo, which makes nothing of the hardest timber, is said by the Portland Oregonian to "stand off and gnash his teeth in rage as he contemplates the creosote treated piling" of the Southern Pacific. This process is expen-

sive. It takes one dollars worth of creosote to preserve one cubic foot of wood. A cheaper process is under experiment in England where engineers have succeeded in extracting the sap by electric osmosis and sucking into its place an antiseptic mixture of borax and resin. This process will probably be known as the Nodon-Bretoneau process. Another inventor whose work is still in the experimental stage has examined extracted sap, and finding it to be albuminous and coagulable, has taken a hint from hard boiled eggs and solidified the sap in place. He claims that, without making the wood hard to work, he has removed the possibility not only of decay but of shrinkage.

The capacity for interminable shrinkage is the great fault of wood, and, for any fine and permanent use of the material, something must be done to overcome this fault. The trouble seems again to lie in the sap, so that woods treated with preservative after extraction of the sap should be comparatively free from shrinkage. The simple practice of soaking in a pond, which is practised in country places, has this end in view ; and it is far more effective than kiln drying. The rapid swelling, when exposed to moisture, of kiln dried wood which has received no other treatment, as compared with the comparative steadiness of soaked boards, seems to point to the sap as the seat of the hydroscopicity of wood. To dry in a kiln a board with the sap in it is to deprive it temporarily of its moisture, so that it comes out of the kiln hungry, and paint cannot keep from it the moisture it craves. It is of little use to specify a condition of dryness which cannot be made permanent. The wood is bound to attain the same proportion of moisture as the air of the house. The air of inhabited houses is found to contain usually about 10 per cent. of moisture. Flooring or other finish ought therefore to be brought into the house when the building has reached as nearly as possible its normal condition of dryness and temperature, and the wood ought to contain about 10 per cent. of moisture. It is easy to ascertain the proportion of water. If a piece is cut from the middle of a floor board, weighed, heated till dry and weighed again, the difference between the two weighings is the weight of moisture, and this should be ten per cent. of the weight of the piece when dried. If, as is usually the case, there is little hope of precision in the proportion of moisture in the wood, and good work is still sought, there remains the expedient of specifying quarter cut wood. It is the unequal consistency in the structure of the rings that makes tangentially sawn boards warp under shrinkage. The summer wood in the annual ring is thicker than the spring wood, and takes up and parts with more moisture than the spring wood. In tangential boards these portions of the ring are often opposed to one another, and the consequence is warping. There may also be a great width of summer wood and consequently great shrinkage. If quarter cut wood is used the shrinkage will be much less and there is nothing to cause warping, for the structure is the same on both sides of the board.

There is this to be said in addition in favor of seasoning by soaking, that it is as effective to prevent decay as it is to prevent shrinking and swelling. It is the sap and soluble portions of the wood that form the food of the fungus of disease, and when these are washed out the liability to decay is gone.

In the matter of inflammability, much may be done by treatment of the wood. The application of silicious compounds has in experiment produced such results in England as to cause a decrease of 50 per cent. in fire insurance rates for buildings in which the wood is treated in this way. Experiments by the Belgian government exhibited the efficiency of treating wood with a solution of ammonium salts. Ammonium phosphate was found to be the most efficient. By the production of a non-combustible vapor, fire, which attacked untreated wood in less than two minutes, was retarded in its action for forty minutes. Such retardation is all that can be expected, but it is sufficient to reduce the inflammability of wood so that it is no longer a menace to the building in which it is used, but will instead prevent the spread of flames for such reasonable time as is necessary to let the fire department get to work. Thorough impregnation with ammonium phosphate, at 25 cents a pound, would be expensive, as it would require about four pounds to the cubic foot, but thorough impregnation is not considered to be necessary.

It is evident that, with proper care and the application of science, wood can be made more efficient than it is as we use it. Greater care is the natural accompaniment of greater value and the time is not far distant when the value of wood will rise to the point of *finesse* in its use. England and Germany still use wood to the extent of one quarter of our consumption in proportion to population. This amount may therefore be taken as the point of necessity. The amount represented by this point of necessity must steadily increase as our population increases ; but in the meantime the forests are decreasing and, unless measures are taken to reforest, and taken speedily, the maximum value of wood will soon be reached.

ILLUSTRATIONS.

COURT HOUSE, NANAIMO, B. C.—F. N. RATTENBURY, ARCHITECT.

A BUNGALOW, BEACONSFIELD, FOR MR. C. L. SHOREY—J. RAWSON GARDINER, ARCHITECT.

DRAWING ROOM IN RESIDENCE OF MR. F. B. FETHERSTONHAUGH, MIMICO—HENRY SPROATT, ARCHITECT.

OFFICE BUILDING, WINDSOR, NOVA SCOTIA, FOR MESSRS. C. D'W. AND J. SMITH.—ELLIOTT & HOPKINS, ARCHITECTS.

COMPETITIVE DESIGN FOR ADDITIONS AND ALTERATIONS TO THE MERCHANTS' BANK BUILDING, MONTREAL—MESSRS. TAYLOR & GORDON, ARCHITECTS.

The conditions of competition issued by the bank required the addition of four more storeys to be placed on the old bank building, and great stress was laid by the bank on the absolute necessity of the "Design for these additional storeys being made to conform to the architectural style of the present building, and the two facades when complete must present a uniformity of design and not appear as two buildings of different design one placed over the other." This is emphasized further on in the conditions as follows : "The design for the exterior of the new part of the building will have of necessity to conform to the architecture of the old part. The present building though not arranged as it would be if designed to-day is nevertheless one of the best designed buildings in the city and in preparing the design for the new portion, the same style of architecture must be carried out, so that with the building complete, the old portion instead of being detracted from would be increased in importance and dignity."

Branch Office of the CANADIAN ARCHITECT AND BUILDER,
New York Life Building, Montreal.

AUGUST 12, 1899.

FIRE ESCAPES.

The chief of the fire department, in his annual report to the council refers to the negligence of owners of large public buildings in this city, in not equipping such structures with proper fire escapes, as required by the fire by-laws. He expresses his intention to visit these buildings and compel by all possible means the responsible parties to conform with the law in this regard.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

The annual meeting of the Province of Quebec Association of Architects will be held in Quebec in September. The exact date has not yet been chosen. I have heard the opinion expressed that it would be to the advantage of the Association that Mr. Raza should be elected to the presidency for a second term, and that the persons who may be elected thereafter should hold the position for two years. The Association are now comfortably housed in their new up-town quarters on St. Catharine street, and contemplate making, at an early date, considerable additions to their library. At the recent students' examinations, Mr. Gaulin, of Montreal, passed the preliminary examination. One other candidate for this examination and two candidates for the final examination failed.

A MODEL SUBURB.

The experiment is to be tried of establishing in the east end of the city a model suburb, to be known as Viauville. It will comprise the Viau estate, which has been divided into four thousand building lots. The managers of the estate are now laying out streets, putting in a drainage system, planting trees, etc. The property fronts on both sides of Notre Dame street, and extends down to the river. On the river side it is proposed to establish a park, wharves, boat houses, etc., for the use of persons purchasing land and erecting houses on the estate. The lots are being sold subject to the condition that houses erected thereon shall not be less than two stories in height and shall be constructed of stone. This is interpreted by some who have already become purchasers to mean that at least a portion of each house must be built of stone, and that brick and other substantial materials may be used in connection therewith. If the condition is to be more strictly interpreted, it will be difficult, if not impossible, to avoid monotony in the appearance of the buildings. It is to be regretted that restrictions as to the character of the buildings to be erected were not imposed in some of the older suburbs, where may now be seen rows of double tenement houses like to those erected half a century ago in the thickly populated districts of the city. It is understood that St. Catharine and Sherbrooke streets are to be extended through this property, which, under the terms of sale, is exclusively reserved for residence purposes.

NOTES.

The Laprairie Brick Co., of this city, has been incorporated with a capital stock of $150,000.

The Dominion Bridge Co. have under construction at Lachine five steel scows 100 feet long, 26 feet wide and 8 feet deep, sheeted with 4 inch pine. These scows are to be used in the construction of the interprovincial bridge at Ottawa.

Indignation has been aroused by the action of the Road Committee of the City Council in granting to the proprietor of a public refreshment booth the privilege to erect a large kiosk in Victoria Square. The Committee have not even the poor excuse that a considerable sum would be paid into the city exchequer, as no charge is proposed to be made for the privilege. The City Surveyor has very properly refused to sanction the Committee's action, and the Council will no doubt also refuse its consent.

BY THE WAY.

An architect in a neighboring city advertises his work in this peculiar manner : "It is a delicate compliment to the cook when you call for a second plate of the same dish. This kind of compliment has been paid this office by clients, not the second time, but time and time again."

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The famous promontory on the coast of Antrim, Ireland, known as the Giant's Causeway, is figuring in the Irish courts, and that, too, with a risk of its ultimate inclosure, if not from public gaze, at least from free investigation. It has now been decided in the Dublin Court of Appeals that the syndicate which leases the adjoining territory has also the sole rights over the curious ridge of basaltic columns in which Irish legend professes to see a remnant of the bridge built by the doughty giant, Fin MacCool, for his passage across to Scotland to his victory over a rival hero.

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The following appeared recently under the heading "A Boom Town in Marble" in the columns of the Portland Oregonian : "I was assistant engineer on the Ontario and Quebec Railroad, a branch of the Canadian Pacific Railway," said an engineer in Tacoma, "and in running our preliminary lines one of them touched Bridgewater, Ontario, a deserted town, that was the personification of Oliver Goldsmith's 'Deserted Village.' Bridgewater was brought into existence by one of the strangest gold finds and crazes in the history of this continent. Nearly twenty-five years ago a farmer's wife was searching the woods surrounding their farm for a sow that had strayed, and, becoming thirsty, stopped to get a drink from a spring. Slipping, she fell against a small, loose rock, which rolled to her feet, and which proved to be a twenty pound nugget of almost pure gold. Bridgewater at that time was nearly forty miles from the nearest railroad, and the present site of the town was nothing but a wilderness, but the effect of that accidental find of the farmer's wife was such that inside of six months what had been a burned-over barren wilderness was converted into a substantial city of nearly 5,000 people. In digging a shaft about a mile south of the town site, on the claim of Billia Flint, a life Senator of Canada, an immense quarry of the purest white marble ever found on this continent was discovered, and at the suggestion of the Senator, the town of Bridgewater was practically built of marble, for it has to-day the only hotel, church, school, court-house and private dwellings constructed entirely of white marble in the world, and a mile north of the town are an abandoned axe factory and grist mill, whose foundations are built of the same beautiful material. During the building of the town thousands of men prospected the entire country, and shafts and tunnels were driven—some of them nearly one hundred feet deep, but, strange as it may seem, there was never enough gold found to pay the cost of a single shaft or tunnel sank or run in the entire district. So excited did the farmers around Bridgewater become that some of them actually hired guards to keep men from going on their land to pick up gold. Pat Keheo, an old Irishman, who owned one hundred acres of rock-strewn barren land, was offered $125,000 for his holding, but held out for $150,000. To-day you could buy the property for probably $150. One rancher, whose farm adjoined 'Aladdin's Cave,' the place where the original nugget was found, sold five acres to an English syndicate for $100,000, and it is an established fact that the syndicate spent as much more developing their claim, as everything was very costly, all material having to be hauled nearly fifty miles, over rough roads ; and they did not get a single ounce of free gold out of their purchase ; but they mined some quartz—about one hundred tons—shipped it to the States, and in return, got a bill from the smelting company for $360 smelting charges over and above the gold in the quartz. This was the first, and I believe, the last, shipment of quartz ever made, as the cost of hauling, shipping and smelting was $150 a ton more than the rock produced."

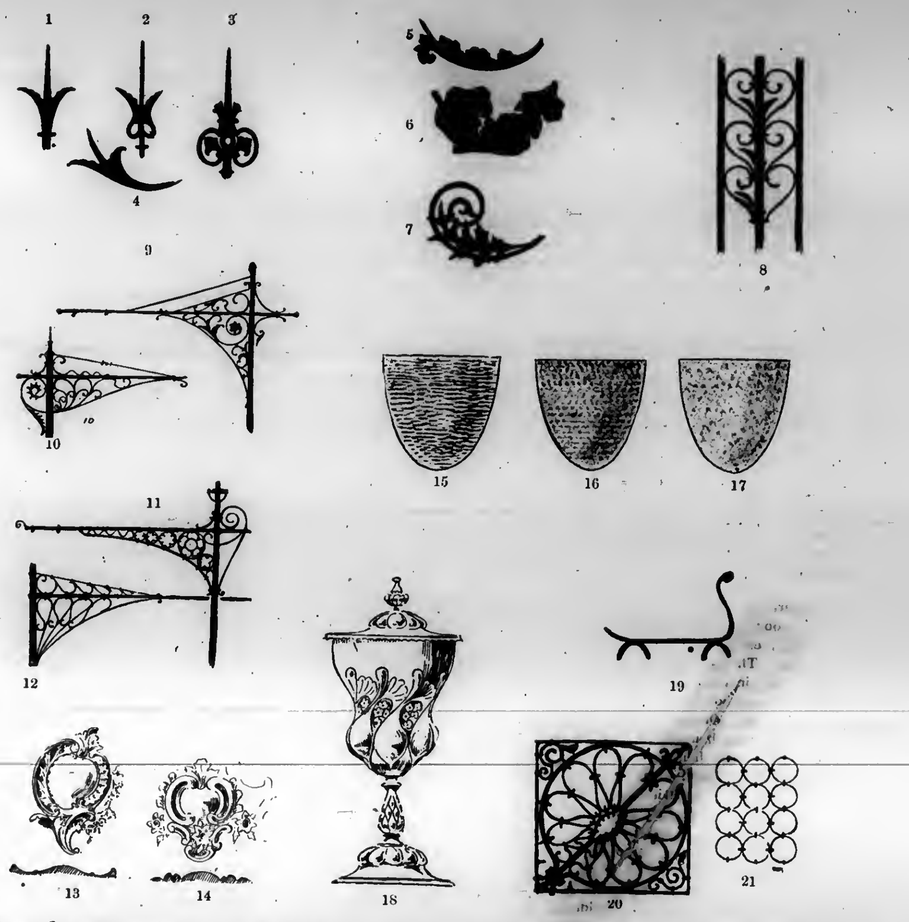
METAL WORK.*

By T. Swaffield Brown, Master of the Art-Crafts Guild, Sheffield.

Metal work includes a very wide range of material and purpose. To this latter belongs the distinction between ecclesiastical and domestic art. The only difference in the past was due to the requirements of its purpose. The material was the same, the workers the same, and the prevailing style was the same; but in past days men's religion was a part of their lives and influenced their work, and no doubt the work for the sanctuary, the visible symbol of their faith, was more lovingly elaborated than that for use in domestic life.

But I do not propose to go into historical retrospect more than by casual reference. It has been done in volumes by the historian and the archæologist, and you probably know all or more about it than I could tell you. The work of the past is incalculably valuable in its teaching, but unfortunately much of it has been neglected and lost sight of, and only its outward and visible results have been made use of as patterns for reproduction. But these were the expression of the thoughts and impulses of their makers, and what we want is the expression of the thoughts and impulses of our makers. It was done as well as their means enabled them to do it; we want ours done as well as our means will allow us to do it. Our material means are as ample as theirs at least, but are chiefly devoted to copying what they did, with all its accidents and crudities, instead of being applied to the realization of the principles.

For it should be remembered, in connection with ancient work, that it was executed under conditions widely different from those under which we live. For long periods there was no settled feeling of security. The church and the home were—in different degrees—alike fortresses, fitted for the stress of warfare and the possibilities of defence rather than the enjoyment of such comfort, and even luxury, as have now become matters of course with us. And the character of their work reflected these conditions.



Nos. 1, 4, 5, 8, 9, are examples of the "rust works"—No. 9 (a sketch of the tram traction poles now erected in Sheffield) being shown as an example of bad design, the thick tie-rod at the top pointing out the futility of the decorative spandrils; Nos. 2 and 3 are suggestions for the avoidance of rust ravages; No. 6 shows the effect of redundant foliage, and No. 7 that of properly treated (i.e. vertical arranged) foliage in silhouette; Nos. 10, 11, 12 illustrate the remarks as to variety, and Nos. 20 and 21 illustrate the remarks about the value of ties in design. No. 19 is a sketch of "dog" used in pairs to support wood, and therefore out of place in the modern "art" grate for burning coals. No. 15 shows the effect of the first or forming stage of hammering a silver cup or vase body, No. 16 the next stage, and No. 17 the random markings of the hammer used as a decoration but not constructive. Nos. 13 and 14 are sketches showing how the peculiar curve of raised silver or copper lends itself to decoration as exemplified in the Louis XV or Rocoro style, and the wretched travesty of it produced in England in the early Georgian period and copied now in tons of silver goods every year. No. 18 is a design intended to show the great malleability of silver and treatment it is susceptible of for display of brilliancy of surface when required.—T. S. A.

So that we should use our study of the past as a backsight to assist us forward, and only so, because otherwise, if we work back to it and merely copy it, we shall only produce anachronisms and incongruities. We shall stultify our skill, and record indisputably—and more or less accurately—to future generations, our utter sterility of imagination, if not our want of common sense.

I have made these remarks so that you shall not think that in what I have to say I am insensible to the beauties of old work; I am not, but

* Abstract of paper read before the Sheffield Society of Architects.

keenly sensible to many which lie deeper than the surface; but I am the more concerned with the new, that which we have to live with (some of us by) in the present, and to be remembered by in the future.

It is curious to reflect that, through all the centuries, and in these days of startling discovery, the metals used generally in the arts remain substantially those used in the remotest antiquity, i.e., iron, copper and its compounds, bronze and brass, silver and gold, lead, tin, and in some forms, zinc. Platinum, aluminium, and many others have been discovered, but their use in this connection is too limited to affect this generalization. Nickel is an exception, but its discovery and use has done little but mischief in its common form (combined with brass as German silver)—I will mention presently how and why.

PRINCIPLES.

The principles which govern the choice of material and the degree of elaboration to which it should be subjected are simply and precisely those by which we regulate, or ought to regulate, all our other affairs, and may be summed up in a very few words: fitness for purpose, and sincerity.

For instance, iron is the strongest, hardest, lightest and least costly of the metals used in this connection. Therefore it should be used wherever these qualities are of greatest importance; but it is practically black, and extremely liable to destruction by oxidation or rust, and it must be worked at a great heat. These are limitations demanding that its design be simple, exhibited in lines rather than broad masses; that its arrangement of foliation or other features should furnish as little lodgment for moisture as possible, and that it should be capable of being wrought rapidly.

In its cast form it is brittle, liable to fracture either by violence or other causes, such as extremes of temperature; its character can only be that of the material in which the original pattern is made, and that much marred. If these qualities indicate suitability for any purpose, to those purposes it should be confined.

Copper is tough though soft, beautiful in color, heavier than iron and much more costly, extremely ductile and malleable while cold, hardening under the hammer. It cannot be cast, except by the addition of an alloy. With about 10 per cent. of tin it becomes bronze; with about 25 per cent. of zinc it becomes brass. In these three forms, however, we find very different qualities. As fine copper, its toughness—untearability—points to its utility in the form of plate for purposes which require considerable tensile strength and complex form, such as large vessels for holding liquid. Its malleability renders it a fit material for embossed work, especially in exposed positions, in which it is quickly protected by a brown patina which forms upon its surface.

As bronze it is much harder, more costly, very imperfectly malleable. Its great limpidity in a state of fusion, however, and its beautifully colored patina, render it peculiarly suitable for some purposes, in which the hammer is out of the question—such as the casting of statues, bells, etc., to which uses it is practically now confined.

As brass it is less costly, and the most brilliant in color of all the baser metals. Fairly malleable and ductile, strong, but liable to become rotten all through its substance if allowed to get corroded, and consequently needing to be kept bright, it is the metal to use where brightness of aspect is an object. It is capable of being embossed; but as its beauty is only or chiefly to be developed or preserved by polish, it is not suitable for delicate elaboration, but rather for breadth of undulatory surface, the design being worked out in brilliantly reflected light.

Silver and gold, heavy and costly—gold nearly twice as heavy and thirty times costlier than silver—are the precious metals, precious not only intrinsically, but because of their qualities; beautiful in color, inodorous, tasteless, incorruptible, and susceptible of elaboration to the highest degree of refinement, are naturally the materials for precious purposes—for sacred vessels and symbols, for the higher domestic uses, for personal adornment, for insignia of rank or degree, for all intimate use and personal contact.

These being the principles of selection of material, the next principle, the great one of good craftmanship, is "Sincerity."

Whatever the material and the work is, that it should appear to be. Whatever purpose it is to fulfil, its design should fit it for, and point to. Whatever the character of the material may be, its manipulation should develop and not destroy it.

Consciously or involuntarily actuated by these principles, and hammer in hand (not in the drop stamp), the smith will do good work whether he thinks he is doing art work or not; and without them he will not do good work, even if he thinks he is doing art work.

And now as to means. The chief, the archetype of smiths' tools, is the hammer. "By hammer and hand," the adage says, "all things do stand;" and only by it, controlled and directed by heart and head (that is, by will and by skill), can his work stand.

The effect of a hammer stroke can be got by no other means. The hammer is a part of the man who wields it, and the instrument through which his imagination or feeling finds expression; every blow has a subtle bias, perhaps unconsciously given, which aids that expression; and as soon as you begin to substitute mechanical work for imaginative, you throw away the substance for the shadow, the living thing for the dead body; you discourage skill, and lower the value, the mental and moral status, of the worker. Handwork owes much of its charm to effects which spring spontaneously from various causes, physical and mental, perhaps in the quality of the metal or the condition of the temper of its worker, but which give individuality to every curve, or frond, or boss, which often lead to fresh developments hitherto uncontemplated; and so the work gains variety without departing from the general intention or impairing the utility of the object.

This touches the questions so often discussed, of machine-work versus hand-work, and "When does a tool become a machine?" Well, I think a tool becomes a machine as soon as it is taken from the hand of the living man, where its direction and force is subject to the slightest variation of his will, and made the instrument of involuntary and unsentient energy, in which position it may only be employed legitimately for the doing of labourers' work, the putting of material into convenient form for elaboration by hand, and thus saving the expenditure of much human energy without superseding human art.

In the actual working of the metals there is little difference of process, the greatest being that iron, speaking generally, must be wrought while hot, and all the others can only, or better, be wrought cold (although heat is necessary in some stages of the work). For this reason I shall deal chiefly with iron and silver, because silver processes are fairly representative of those of the other metals.

IRON.

Iron, as you all know, is through its possession of the qualities I have mentioned, a metal of very wide and varied use. In its wrought form, its great strength and hardness fit it especially for the defence, security and protection of more precious things; and for other purposes, involving power of resistance to force; and its stern aspect is in keeping with such duties. But for all that it may be made exceedingly comely under proper treatment, and the docility with which it submits to such leaves no excuse for its neglect.

You have been spending a large amount of money in wrought iron work for tramway purposes, and what have you got for it? Wrought iron, yes, of a sort, but one pattern to every detail repeated every forty yards, I believe, to hundreds. (I suppose now, if you were to substitute for these, beautiful golden angels, with jewelled crowns on their heads, and hands outstretched holding the wires which, you think, are to be such blessings to the city, your admiration of the first would be turned into scorn or indifference very quickly by their palling uniformity of expression.) Well now, if these are wrought by hand, each might have its own character, or, at all events, you might have had a considerable variety—it is done in some places—without adding to the amount of work fixed by the proposed expenditure. Some would be better than others, some probably bad; but you have discords in music sometimes which are useful.

The process of working is simple. Forging, bending and welding are the principal operations. Forging is the creation of the desired form by hammer strokes out of the rough material; bending explains itself; and welding is the joining of separate parts by hammering them together at an intense heat. This method is peculiar to iron work, and by succession or combination of these operations the whole work is done. Its results are most familiar to us in the form of screens, gates, door-hinges, etc. As its dark surface reflects but little light, it is generally seen en silhouette, therefore its design should be clear in outline and its details very distinct. It is worked in fits of heat which rapidly subside, therefore its detail should not be dependent upon prolonged elaboration for its effect. Welding heat is apt to become destructive, "burning" the iron and impairing its strength, therefore welds should not be unnecessarily multiplied, especially between parts of unequal thickness. Ties and bolts often become pleasant features in the design, making decided little breaks without disturbing or obscuring the lines on which they occur.

Foliation is a difficult subject to deal with. In the form most generally used—that of an acanthus frond partly enveloping the stem upon which it grows—I think it entirely out of place. All foliation on this class of work should be in a vertical plane or approaching it, and kept as clear from the stems as possible, not only because otherwise it blurs the lines of the work, but because it becomes a fruitful source of mischief unless very carefully dealt with.

For instance, upright rusks surrounding a central spike, unless kept open at the bottom, catch the rain and dew and store it at

the root of the spike. A leaf clasping the lower curve of a volute, or in many other situations, does the same. In each case a little laboratory is set up, and commences operations at once for the conversion of good iron into rust, which for our purposes is destruction. Witness the new gates at Weston Park, and the new electric traction posts. The old gates of the same park, though much smaller and less pretentious, are good in design, and all these principles are in force in them, and it is perhaps hypercritical to suggest that they would have been better with more ties and fewer rivets; but at all events they are now in better condition than the new ones.*

All the greater curves should be designed to make contact with others or bars, and should be tied at that point as often as possible. Two curves of weak structure become strong by mutual support when so treated.

Of course these considerations do not apply with equal force to chancel screens, gates and grilles, and such interior works, which are not subject to such destructive influences nor seen in the same light as out-of-door work; but the same principles and processes govern their construction.

Different conditions come into play again, in such work as hinges and clamps for doors and chests. Here the iron-work is carried and kept in position by the wood, which it protects, strengthens and adorns. (I do not forget that the hinge really carries the whole thing, but I am speaking of the ornamental development of the outer clamp). The governing conditions are the gradual distribution of substance from the points of suspension, the necessary positions of the holding bolts, and the flatness of the surface, which it must closely fit.

For these and similar purposes the work should be hammer-finished, not only because the hammered surface is most durable, but because it is most expressive of the character of the material and the method by which it is worked. At the same time, in avoiding the seductions of mere smooth finish, as it is called, we must not allow ourselves to be deluded into the idea that rudeness is a virtue per se, and exaggerate it purposely, as is frequently done now.

But under other circumstances it may be quite necessary to give higher surface finish, as in locks, keys (and, in the past, body armor), which its great strength makes it the most fitting for. Here its susceptibility to high elaboration is a useful quality. It may be chiselled, embossed, twisted, filed and ground, and damascened.

This mode of surface decoration is a very tedious and delicate one. The lines of the design are chiselled or graved very deeply; gold wire or plate is then laid in the grooves and hammered; this drives the gold in, and brings the edges of the groove partly over it and locks it in. This process is seldom practised now; but another and easier one is the etching of the ground away by acid, and burnishing very thin gold upon the raised lines while warm. This process makes work which is extremely liable to damage; the other cannot be injured by any means short of the destruction of the object decorated.

Silver and gold, though differing widely in weight and value—gold, as I have said, being nearly twice as heavy as, and thirty times more costly than, silver—I propose to deal with together, because their processes are the same, only differing in scale from each other and from those of other cold-worked metals. In their pure state they are extremely ductile and malleable, but they are seldom used in that state, on account of their softness. To remedy this, silver is alloyed with copper in the proportion of silver thirty-seven, copper three. In this state it is ca led sterling or standard silver, because it is the standard of silver values, and is always referred to where silver is spoken of, except in the rare instances of the use of fine or pure silver, which is always distinguished as "fine." These are the only two qualities recognized by assay masters, and are stamped or "Hall marked" with different symbols.

Gold is alloyed with silver or copper, or both, it may be in any proportion, but is only marked as 22, 18, 15, 12 and 9 carat by the assay masters. (Carat in this use is not a fixed weight, but merely the twenty-fourth part.) There are two standards, the first of twenty-two parts fine gold with two of alloy, which is the standard of gold coinage; and the second, eighteen parts fine with six of alloy, which is the standard of gold work generally, and is understood if quality is not specified.

The art of working these metals, as practiced of old, and as it must be again if silver work is to remain "art" work, is now all but lost. Improvements of process—the electro-plating vat, the steam stamp, the spinning lathe—have, by the fatal facilities they offer for the evasion of skill and the production of imitations of its results, reduced the silversmith to a mechanic; and the character and qualities of the material, instead of being developed and manifested in the work, are really thrown away.

For instance, let us consider, as a type of silver work, the making of a drinking-cup (in ecclesiastical use, a chalice). It is the emblem of hospitality, from the time of Melchizedeck, and of fellowship in the greatest society in the world, the Holy Catholic Church, and therefore claims precious material and the best work. The bowl and foot are each hammered out of a disc of metal (formerly as cast from the crucible, on a flat stone or anvil, but the need of the mere labour of the earlier stage of the work is now superseded by the rolling mill). After being roughly dished into the hollow of a wood block or sand-bag, it is hammered on the outside in circular courses, with a hammer adze-shaped but blunt, upoo a round-surfaced iron, squeezing the metal upward and inward and distributing its substance gradually as it is needed, thick in the bottom and thin at the lip, or otherwise as the worker wills, until the form desired is attained—all is as regular as the deposits which build up a snail's shell or a crystal, and the same results follow, good line and contour. In this state it is marked all over with the evidences of its process, the impressions of the hammer, in the form of long hollow grooves, to the axis of the bowl. These are removed and the form still further developed by a similiar operation with a flat-faced hammer (called a planisher). This leaves the inner surface quite smooth, and the outer covered with faint hexagonal facets—again you observe that these are the evidences of process, and their regularity is the index of the worker's skill and the perfection of his work; but it is not intentional, it is merely the accident of the process, and is generally removed in finishing or by subsequent decoration. These two conditions of the work are the sources of origin of that class of work which has been much practised lately under the euphonious titles of "chip-hammered" and "bullet-hammered," neither of them possessing the character of the original, and only serving to disguise the want of invention of its designer. The whole work is entirely dependent upon the skill of the craftsman, and this simple object illustrates the whole art of the silversmith. But now—a disc of silver is banged into a steel die, with a ton of iron for hammer, or is wrapped round a revolving piece of wood by the pressure of steel tools, and its character is that of the steel die or the turned piece of wood. It is exactly like a multitude of others, all weak where they should be strong, and heavy where they should be light—all wrong; and those that make them become like unto them.

Having indicated the principles, and touched upon the processes of metal-work, I will add a few words about the revival I spoke of at the commencement. One of its evidences was visible in Sheffield a short time ago in a collection exhibited in the New Gallery, which did not attract the attention it deserved. Without saying that it was altogether admirable—it contained some very beautiful objects—it was full of suggestion, and showed an appreciation of the qualities and capacities of material, and a freedom of treatment, which were absolutely refreshing. But there were evidences of affectation (which is poison to good art), which point the danger I referred to of neglect of principles; such as the imitation of the crudity of old work; the covering of articles with irregular hammer marks, not as the result of the forming process (or, if so, the work was very badly done), but for their own sake as decoration; and similar tricks unworthy of the name of art, which must not be practiced if that revival of the union of heart and head, hand and hammer, is to be realised and resume its power as the expression of the presence of art in our midst.

To which happy end I, as an earnest craftsman, ask you, the architects and art leaders of Sheffield, to give all the assistance of your influence for the honour of your city and the credit of your country.

In the foundations of the new Chicago Post-Office, piles have been driven to a depth of over seventy-five feet, these being surmounted by broad timber caps covered with a deep bed of concrete, which forms bases for the stone piers, which in turn support the 208 steel columns carrying the building. It is said that in this foundation, when completed, there will have been used over 5,000 piles, nearly 800,000 feet board measure of timber capping, 150,000 cubic feet of concrete, and over 350,000 cubic feet of stone.

* The posts I refer to are not good in design. The ornamental work is flimsy in execution, and does not properly fulfil its ostensible purpose, that of supporting the span carrying the cables. Its futility is indicated by the tie rod introduced above it to do its work.—T. S. B.

HAMILTON

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

A CASE of considerable interest, especially to builders, that came before a local judge here recently and was carried to Osgoode Hall, has just been decided. A man named Consuis entered into an arrangement with one Teeter, a builder, for the demolition of an old barn and the building of a new one of larger size to replace it. The builder was to use the old material as far as possible and make up with new. As the work proceeded the owner expressed dissatisfaction with the new material supplied, and sought an injunction through the courts to force the builder to substitute other material. An interim injunction was granted by the local judge. Falconbridge, J. held that the Courts of Equity will not interfere in the case of building contracts. At the present state of the works there was no evidence to show the contract was improperly carried out, and the court would not act as clerk of works. According to the terms of the contract, apparently nothing need be paid to the contractor until all the work is completed; up to date nothing has been paid. The owner's only remedy is upon completion of the works, when, if not satisfied, he can sue for damages. The injunction was therefore dissolved.

At a recent meeting of the Hamilton Steel and Iron Company, the following directors were elected: A. T. Wood, M.P.; C. E. Doolittle, A. E. Carpenter, C. S. Wilcox, John Milne, A. M. Wilcox and W. Southam. At a subsequent meeting of the directors, A. T. Wood, M.P., was elected president; C. E. Doolittle, vice-president; Robert Hobson, secretary, and C. S. Wilcox, managing director. It seems as if Hamilton will, before long, be a centre for the output of iron and steel; it possesses particular facilities for transportation of material, and several moneyed men interested in these materials are operating with that end in view. The remarks of Mr. Frank Baird, an iron producer of Buffalo, with regard to the advantages possessed by Canada for the production of iron and steel have appeared in the daily press all over the country, and it is certain that this city occupies a position which ought to secure for it a great trade. It has also attracted the attention of the electrical engineers, and a syndicate, in which Mr. John Patterson is the leading spirit, is rapidly securing control of the existing electric railways not only within the limits of the city, but of the radial lines that run out into the country. Other electric routes are contemplated by this company, for which bills have been submitted to the Railway Committee of the Dominion house. This same company has also secured the contract for the lighting of the city by electricity, all its power being generated at Decew Falls, about 37 miles away. People who have thought that Hamilton was dead, are beginning to think "there is life in the old dog yet," and that perhaps after all its destiny is not that it shall be absorbed by Toronto.

There is not much to comment upon this month in the way of building operations. As a rule the architects are not busy. The only noticeable thing from an architectural point of view is the completion of the tomb and vault that Senator Sanford had erected in the cemetery to the memory of his son, and which was just completed in time to receive his own coffin. It is a charming little classic temple, but it has been spoiled and knocked out of all proportion by the statue of "Hope," pointing heavenward, that has been placed on the apex of the main front. The statue is so large that the temple is dwarfed until it looks like an ornamental base for the figure, instead of the statue being subordinated to the temple. The tomb occupies a conspicuous position on a mound near the larger road and was erected at a cost, I believe, of nearly a hundred thousand dollars, the material being white marble.

The monument to be erected on the battlefield of Stoney Creek, a few miles from Hamilton, is causing a lively discussion in the papers. A site was purchased for the purpose by the Women's Wentworth Historical Society and presented to the government, and now it is disputed that the battle was fought at or over this particular spot. It is known as Gage's farm, and the evidence that part at least of the battle was fought there is almost conclusive. Even if it were not so, it is so near the ground that undoubtedly was part of the battlefield, and being the only elevated site at the place, it would not be inappropriate to erect the monument there.

R. W. GAMBIER-BOUSFIELD

TREATMENT FOR A DRAWING-ROOM.

The first concern in a drawing-room, writes Mr. W. Scott Morton, in the Art Journal, is the method of lighting, both artificial light and daylight. It is not always possible to avoid heavy shadows, but here a well-diffused daylight is desirable. It should come from the sunny side, with, if possible, subordinate windows when the outlook is good. The ornamentation of the room and all objects which are placed in any picturesque grouping, as well as the people in the room, look to best advantage when the light is strongest from one side. In artificial lighting, a main central light is found most successful for the apartment generally, but many things in the room often lose the artistic value they possess in daylight by the alteration of the illuminating centre, which causes a different light and shadow relief. When a drawing room has ample window space, and it is considered desirable to retain all the daylight, the treatment of the decoration should be delicate, for fulness of color and strong detail are almost sure to run to coarseness, unless a very skilful hand controls. When the light is scanty, luminous tints and strong contrasts of form and color are desirable, as they help greatly to relieve the apartment of the blackness of the shadows, and make use of them to help the color effect. Where there is a recess or dark corner which is objectionable, there is often presented an opportunity for adding the best touch to the apartment by setting something of china, bronze, statuary, flowers or a screen, which will tell with much effect in the shaded setting surrounding shadow; provided, of course, that such objects be so placed as to catch a favourable light. In light rooms a soft-colored wood like satin wood is certainly the best, but in lower-toned rooms dark woods like mahogany or rosewood, relieved with ormolu or gilding, are most fitting. When a cheerful room is desired nearly everyone thinks of white painted wood. It is clean and easily obtained, and raises no serious ground for criticism; but in every case where white is used it should be tinted to allow of its easy assimilation with the strongest color, be it on the wall, seat covers, or floor. Of the ordinary wall papers little need be stated here, except that it will generally be found that those which are the most pleasing for homely rooms are not those which ordinarily attract one in a decorator's showroom. The mass of a wall color is always stronger than appears in a small pattern, and it is safe to choose a color which will be a pleasant offset to the complexions of the ladies who are to be "at home."

IMPROVEMENT OF THE CAPITAL.

The Dominion Parliament at the session which has just closed, adopted the following resolution: "That it is expedient to provide that in consideration of the municipal corporation of the city of Ottawa providing adequate water supply and fire protection for the property of the Dominion government in the said city and in the vicinity thereof, and exempting the Dominion government from any charge therefor, the Minister of Finance and Receiver-General be authorized to pay out of the consolidated revenue fund of Canada the sum of $60,000 per annum for a period not exceeding twenty years, for the purposes of improving and beautifying the city of Ottawa by the acquisition and maintenance and improvement of public parks and public squares, and the improvement of the streets and thoroughfares in the said city such sum to be paid to a Board of Commissioners, to be appointed under the authority of an act of the parliament of Canada to be passed for such purpose."

The action of parliament in this matter will we believe be universally approved. A feature of our national ambition should be to make the capital of the Dominion in the highest possible degree attractive and interesting. A wise choice of commissioners is the next important step toward the accomplishment of this end.

STUDENTS' DEPARTMENT.

MARTELLO TOWERS IN ENGLAND.

Whatever may have been the defensive value of martello towers a century ago, it has entirely evaporated now, and it is not surprising to find that one or two of them at Bawsdsey Haven, on the Suffolk coast are being demolished. There are a good many of them on the coasts of Essex, Suffolk, Kent and Sussex. These massive round towers, some forty feet high, were regarded as, and very likely were, splendid defenses at the time they were erected, but they have long been used only for coastguard purposes. Their name is derived from the Italian coast towers which were erected as a protection against pirates. Warning that a suspicious craft was in sight was given by striking a bell with a martello, or hammer. It was the powerful defence made in 1794 by Le Tellier at the tower of Martella, with only thirty-eight men, against a simultaneous sea and land attack; led by Lord Hood and Major General Dundas, which brought them into favor in this country. It was thought that they would be a splendid defence against "Boney."—The London Chronicle.

WORKMEN'S DWELLINGS IN GERMANY.

The United States consul at Chemnitz writes that there is a movement on foot to furnish working men with better dwelling-places in Germany. At present they are crowded into buildings which often look like barracks. The proposed houses will be built upon plots of ground about 16½ feet wide by 102 feet deep, thereby allowing for a front yard for flowers, and a back yard for a vegetable garden and shed, the latter for the keeping of poultry or some domestic animal. The houses will contain five rooms. A parlor and kitchen will be on the first floor, the parlor containing a porcelain stove and heating pipes, and the kitchen a wash boiler and stove. The three bedrooms on the second floor will easily hold five or six persons, and can be made to accommodate ten. In the largest an iron stove will be placed. A pump will provide water where the city waterworks do not extend to the house. The cost of such a house and plot of ground when a number are built at a time will be between 170l. and 190l. It will let for about 9l. a year—that is for the same price the working-man has to pay for two rooms in the barrack-like tenements of the large cities.

HINTS ON DECORATION AND FURNISHING.

The private office of a well-known architect, writes Edward Hurst Brown, in the Painters' Magazine, has been hung with curious old pieces of German tapestry, with quaint figures of burghers in high top boots and rosy-cheeked maidens in red dresses, walking amidst stiffly trimmed trees and gardens of formal flowers and foliage, with perhaps here and there the towers of a castle seen in the distance. The ceiling is supported by heavy oak beams, stained a dull black, between which the panels are covered with natural tinted burlap with stenciled figures in dull reddish brown. The deep carved cornice has heavy modillions from which the beams apparently spring. On the floor of polished oak parquetry, in small square blocks, is thrown a handsome Turkish rug, while in the center of the room is a large square table of black oak, convenient to display a roll of drawings to a client. Cases in one corner of the room contain photographs and books of architectural detail, while here and there are displayed bits of terra cotta, or plaster models of carving used on buildings designed by the architect himself. The inevitable roll-top desk is of black oak, and has been made to harmonize with the furniture and decorations, and while the chairs are comfortable, they have been made to imitate the quaint old German carved chairs that are so artistic. A drawing table in one corner is a convenient working place when sketches are to be made, while on an easel stands a fine perspective drawing of one of the noteworthy buildings which the architect has designed. The broad window is filled with plain white glass, set in lead lines, with ornamental medallions introducing the various tools of the different building crafts. A broad cut stone fireplace on one side of the room is surmounted by a carved hood of black oak, ornamented with armorial bearings in true heraldic colors.

NOTES ON STAINING.

FIRST-CLASS staining can be done only with the best of materials. Water stains are objectionable in that they raise the grain of the wood, and yet their exceeding transparency, and the quality they possess of drying without showing laps, clouds, streaks, etc., enable the workman to obtain better results as a rule than oil and turpentine stains afford. Alcohol stains, in this respect, are ranked with water stains.

The successful stainer bears first in mind the fact that not only is color effect sought, but the figure and characteristics of the wood are to be imitated or enriched.

The really artistic example of staining is that which shows a tone of color due to a combination of the color of the wood and the stain employed.

A good rule to remember when staining is this: The woody appearance is to be sought for; the painty look to be avoided.

Nearly all woods have a transparent quality or power of reflection, changing as the changing light strikes them. The aim of the stainer should be to have the wood retain this reflecting property, this changing look as one changes his position or the daylight shifts.

Only the best dressed and smoothest lumber, clear and clean, knot and sap free, and running barren of soft places or "dead wood," invites the best order of staining.

Concerning the art of staining, an expert advises: "Strive to hide the fact that you are imitating, and after you have secured the desired effect, be careful to keep your color uniform and free from clouds, laps and finger marks."

French artists are now busy in considering the conditions of the competition for the design of the diploma which is to be issued in connection with the International Exhibition of 1900. The designs in the first competition are to be sent in before June 15, and those in the second before September 21. The jury will consist of twenty-one members, of whom eight will be selected by the competitors. It is anticipated that five of the competitors will take part in the second contest. The design selected will be rewarded with a prize of 10,000 francs, and the four artists who are not successful will each have 1,000 francs. The design for the last International Exhibition in Paris was the work of the late M. Galland, and M. Paul Baudry designed its predecessor.

CORRESPONDENCE.

FIREPROOFING MATERIALS.

NEW YORK, July 18th, 1899.

To the Editor of the CANADIAN ARCHITECT AND BUILDER:

Sir,—Your issue of June, 1899, contained a communication from N. T. Gagnon, in which he attempted to discredit the Roebling system of fire-proofing, which has just been adopted in two buildings in the city of Montreal. We note from the advertisement on page 12 that Mr. Gagnon is a manufacturer of the terra cotta or hollow tile fire-proofing. The fact that he is a direct competitor of the system on which he writes would not, of course, influence (?) him in his statements, but the general public would probably be better satisfied with an account of the tests given by disinterested parties.

For this reason we beg leave to enclose the following extracts from the New York "Herald" and New York "Sun" of November 20th.

"AFRAID OF THE FIERY TEST."

(N. Y. "Sun.")

It occurred to the manufacturer of an alleged fireproof material some months ago that it would be a good stroke of business and perhaps the means of downing one or two rivals, to arrange a competitive test of the output of his factory Having hit upon this plan of getting a little free advertising, the manufacturer roped in a prominent city official whose business it is to know about all kinds of building material and proposed to him that he he the judge of the test when it came off. The city official agreed, and forthwith the challenge of the manufacturer was placed in his hands. It was addressed to all manufacturers of fireproof material and stated that the challenger was prepared to stack his product up against any other fellow's product, and show by a competitive test that it was the only real thing in the fireproof line that was being turned out. The challenge was ignored by the more substantial firms in that line, but finally there jumped into the ring one who had recently gone into the business and who was sure that his product could knock the spots out of the stuff turned out by the challenger.

Pretty soon the city official got a notice from the accepter of the challenge, telling him to fix a date for the test. The official fixed yesterday morning as a time, and an open lot uptown not many blocks from the East river as the place. The rivals agreed on certain conditions, it is said, and then the newspapers were invited to send representatives to witness the thing, and maybe to write a little something about it. The newspapers are always invited on these occasions. There wouldn't be any profit in having the test unless the winner could in the words of Insect O'Connor "Git his name in the pape."

But somebody got panic-stricken on Thursday nigh and it wasn't the fellow who had accepted the challenge. The excitement was the result of a rumor which reached the ears of the challenger to the effect that the city official had changed the conditions of the test at the last moment. The challenger rushed to the city official, also to the enemy and to various others concerned in the test. He charged undue influence and various other heinous offences against fair play, but was informed that the test would be made in the way regarded as best for bringing out the qualities of the two materials. Then he wanted to withdraw from the competition, and failing in that demanded that the whole thing be stopped. Again he met with a refusal, so he rushed down to the office of a friend, who is a State Senator, also a lawyer, and laid the matter before him.

"We must stop the test," he said. "We will certainly get it in the neck if the thing goes on as I'm informed it will."

"Nothing easier" said the State Senator. "Come with me."

So the manufacturer and the State Senator hied themselves to the court house where they waylaid a Supreme Court Justice and secured an injunction, which was served on the city official at his house, with the result that the test didn't take place.

The injunction will come up for argument in a few days. Meanwhile the rivals are saying things about each other and the product of their factories. It is not at their own request that the names of the manufacturers are left out of this story.

"INJUNCTION DID NOT RESTRAIN."

(N. Y. "Herald.")

The injunction granted, as told in yesterday's Herald to Henry Maurer & Son, tile manufacturers, to restrain Superintendent of Buildings Constable from making a proposed test of the merits of tile and cement arches in fireproof buildings by burning a building constructed of both materials in a vacant lot at Sixty-eighth street and avenue A, failed of its purpose.

Superintendent Constable accepted the service of the injunction, then transferred the lease of the lot to H. W. Hodge, a civil engineer, o No. 27 Pine street, and Mr. Hines of Hines & Lefarge, arcbitects. Mr. Hines immediately applied the torch to the experimental building and the test was carried out.

After the episode of the injunction and transfer of the lease Mr. Hines set fire to the mass of inflammables, with which the structure was filled. The fire started with a roar. The heat became intense and registered 2,100 to 2,200 degrees, 200 more than is required to bake tiling. After five hours of this heat the tile roof fell in. Then Superintendent Constable sent for engine company No. 39 and extinguished the fire. The concrete roof withstood the sudden cooling off.

The building will be constructed for tests with other materials.

We think further comment upon the matter on our part is entirely unnecessary.

Very truly yours,

THE ROEBLING CONSTRUCTION CO.

PHOTOGRAPHY FOR THE ARCHITECT.

A grert deal is heard of photography in its application to medicine and surgery, of the assistance which it renders to the astronomer and the microscopist; by many others than specialists it is employed to obtain records of old buildings, curious towns and picturesque bits of landscape. Yet comparatively few professional land surveyors and still fewer professional architects are alive to the help which it is capable of affording to them in their ordinary workaday business. That it is of such value the few who have employed it have proved without doubt, going as far as to say that for the surveyor, at least, a knowledge of photography is as essential as an acquaintance with the theodolite. . . . There was a prominent instance of the value of photographs as supplementary to the land survey a few months ago, says G. A. T. Middleton, when architects were invited to submit plans in competition for a new university at San Francisco. The site was an extraordinary one, at the foot of the Rocky Mountains, and rose no less than 700 feet in a trifle over a mile; and of this a plan was, as usual, supplied to intending competitors. On application, however, they were also provided with a scale model of the land and a series of photographs. These would undoubtedly have been more useful had they been panoramic, or even had the directions in which they were taken been more more clearly indicated than was the case, but even as it was they gave a very good idea of the topography, and especially of the way in which the character of the land altered at its different altitudes, and of the views obtainable.

At first sight it is, perhaps, not quite so obvious how photography can be of value to the architect as to the surveyor. Yet it is so in even a greater number of ways. In crowded cities particularly it is of the utmost importance before commencing building work to ascertain and record what is existing on the site and what is surrounding it before beginning operations, having regard to possible legal complications, actions from neighboring owners for infringements of rights of light and other easements, and many other eventualities; and in such cases the evidence afforded by photographs from well selected points of view and taken with suitable lenses, in conjunction with proper plans and models, is most important. By themselves, however, the value of photographs as evidence is liable to heavy discount in court, as many judges, and juries also, have become skeptical of the truthfulness of the impressions conveyed by them, owing to the occasional unscrupulous use of specially wide or narrow angled lenses, for purposes which are sufficiently obvious.

Of equal importance are photographs of shoring and underpinning work, and of all work which is to be covered over and about which disputes of one sort or another are by no means infrequent, owing, in the majority of cases, to the absence of evidence such as a photograph would supply; and almost invariably when bad work is condemned and ordered to be reinstated should the camera be used for the purpose of after reference if necessary. When work is being carried out at any such distance from the architect's office as to render personal constant supervision impossible, the clerk of the works by supplying constant photographs, can keep him in touch with what is going on and by their means a client can often be informed as to the progress of the building for which he is paying in a manner most satisfactory to all parties.

Pulverized lime and ammonia will remove marks and stains from marble.

THE BUILDER

[THIS DEPARTMENT IS DESIGNED TO FURNISH INFORMATION SUITED TO THE REQUIREMENTS OF THE BUILDING TRADES. READERS ARE INVITED TO ASSIST IN MAKING IT AS HELPFUL AS POSSIBLE BY CONTRIBUTING OF THEIR EXPERIENCE, AND BY ASKING FOR PARTICULAR INFORMATION WHICH THEY MAY AT ANY TIME REQUIRE.]

Gravel Roofs.

THERE are gravel roofs and gravel roofs, but good ones are few and far between. There is no reason why a gravel roof should not be a good one, if only proper care and good materials are used in its construction ; at least it should be good for the money expended on it when compared with the cost of tin, galvanized or copper roofs. Of course a gravel roof is only suited for a low pitch or flat roof, as on a steep roof the gravel would eventually wash off and leave the paper or canvas exposed to the weather. Ordinary coal tar answers fairly well for a top coat before the gravel is spread on, if the roof is very flat. If the roof has a good pitch it is a good idea to mix eight or ten pounds of common resin with the pitch while it is boiling, stirring the mass well with a stick before it is taken out of the boiler. To prepare the roof before covering with tar after it is boarded tightly with matched stuff, the following rules should be observed : In all cases the grain of the roofing boards should run in the direction of the pitch—never across it—and all joints should be driven close and tight. The boards should be planed on the top side, and should be free from shakes or knot-holes. Swab the whole roof over with a thick wash of Portland cement mixed with water to the consistency of thick paint. Let the roof dry for a few hours, then lay on a coat of good roofing paper—tarred paper preferred—having a lap of about one-third of the width of the paper. Over this give a thin coat of hot tar, in which ground asbestos, mica or Portland cement has been mixed, in the proportion of one bucket full of cement to four of hot pitch. Let stand until dry and hard. Over this lay another coat of roofing paper, and on this lay a thickness of rough sacking, which must be tacked down here and there with broad-headed tinned nails, such as tinsmiths use in roofing. On this sacking lay a thick coat of the tar while hot, and then sprinkle coarse sand and fine gravel on the hot tar and leave to harden. The tar must contain the proportion of asbestos, mica or cement as described in the foregoing. When the tar or pitch hardens it holds the gravel in place, and the rough sacking over the paper strengthens the whole roof covering and binds the whole together, and to a very large extent prevents the roof from cracking or blistering, faults which are common to gravel roofs, and which cause a great deal of trouble and annoyance. A roof covered in the manner described will make a good serviceable one, and one that will hold good for from seven to nine years, when it may be made good again by a generous coat of the prepared pitch and another layer of fine gravel. Metal roofers do not take kindly to roofs of this kind, but there are instances when no other kind of roof is available, and to meet these instances the above method is offered.

About Concrete.

"SPECIFICATION," a semi-annual work published in London, England, and containing upwards of 525 pages, 9 x 12 inches, in discussing concretes, has the following general notes in the introduction to the subject, which are worthy of being repeated : 1. The average compressive strength of concrete is about eight times its tensional strength. The proportion of compressional and tensional strength varies according to the quality and quantity of the aggregate. 2. The best fire-resisting material for general use in building construction is undoubtedly concrete, when properly made. It can be made completely water-proof and acid-proof, and may be moulded or carved to any design, and colored to any shade. 3. The use of iron in concrete is invaluable for many constructive purposes ; but for general work, unless as a temporary aid, or in exceptional cases, it is unnecessary. 4. Compression done by beating and ramming is a matter of considerable importance ; it increases the weight of concrete about 4 per cent., and the strength about 25 per cent. 5. Concrete should not be thrown in from a height, but spread in layers and rammed until the matrix is flush with the surface. The surface should be brought to a dead level. Norman cement is unfit for concrete in mass ; 1-10th of Portland cement in concrete is equivalent to 1-6th best ground lime. 6. Weight of concrete—If the matrix is of Portland cement, 132 lbs. per cubic foot ; of lime, 125 lbs. per cubic foot. 7. Concrete laid in cold weather * stands better than that laid during hot ; mild, damp weather is, however, preferable to either extreme. 8. The quantity of water required is determined by the class and condition of the aggregate, the state of the atmosphere, and the purpose for which the concrete is required. 9. Common materials in the construction of concrete staircases should be debarred ; a judicious selection, with small additional cost, will produce the most incombustible constructive compound known. 10. Sand is extensively used as aggregate in Portland cement for cast work, mouldings and wall plastering. 11. A secret of success in producing solid and strong work, is the importance of topping the rough coat while it is green. 12. Complete incorporation of all materials, when guaging, is important ; a waste of materials and unsatisfactory results will ensue if care be not exercised. 13. Concrete should be well pounded or rammed immediately after being placed in position. The compression renders it more durable and impervious, and increases its strength. 14. The ramming must not be too prolonged, or it will affect the strength of the concrete. 15. In hot weather it is a good plan to lightly sprinkle setting concrete with water from time to time, in order to allow even setting and prevent cracking on the face. 16. When concrete is to be deposited on any concrete face which has become dry, such surface should be well wetted previous to the application of the new material. 17. Cement concrete should be deposited as soon as made. The concrete, should, after mixing, be rapidly wheeled to the site, gently tipped into position, and then evenly and gently rammed, but not so as to make the surface wet, as the cement exudes from it. 18. In recent experiments the strongest concrete proved to be made with slag ; broken firebrick came next, and then pumice ; while coke-breeze was the weakest. After heating the above to a red heat and quenching them with water, it was found that slag had lost two-thirds of its strength, broken firebrick nearly as much, and pumice about the same, but coke-breeze less than one half ; and that the latter was then stronger than the other three materials. 19. Cement concrete should be used at once, but lime concrete may be left a short time before being used, to ensure the slaking of the lime. 20. Fat lime is no good for concrete ; stone, or hydraulic lime, or Portland cement should be used. The aggregate should be free from clay, loam, etc. The sand should be sharp. Thames ballast is as good as it requires no sand added." The forgoing introduction contains some capital pointers, and some facts not generally known. We may have occasion to quote again from "Specification" in future issues.

*Providing there is no frost.

Builders Exchanges and Labor Troubles

IT is gratifying to learn that through the efforts of several Builders' Exchanges, a number of strikes and labor disturbances have been prevented, and in other cases, by the combined efforts of labor leaders and exchanges, serious differences have been adjusted, and the workmen who had been on strike, returned to work satisfied with the mutual arrangements. These achievements by the Exchanges, are only small beginnings of what may be accomplished—for the good of all concerned—if their influence covered a larger area, and a stronger bond of unity, obtained among the Exchanges. If it were possible that dissatisfied workmen, through the agency of their leaders, could appeal to the heads of some national organization of employers ; and there discuss their grievances, and become acquainted with the conditions controlling the particular class of labor disturbed, there would be a less number of strikes, and much more harmony between employer and employed, than now exists. Speaking for the workmen employed in the construction of buildings—from the man who does the excavating, to the man who lays out and constructs the stairs and hand-railing, no more intelligent, or more reasonable class of workmen can be found in any other trade ; and an impartial discussion of their troubles, when properly submitted to the heads of some sort of a National Exchange, would engender kindly feelings all round, and be a powerful factor in the prevention of strikes or other labor troubles. It is manifestly in the interest of building contractors, that they establish Exchanges in every town and city, having five thousand or more inhabitants. It is not necessary that expensive rooms for the purpose, should be rented ; in fact, in the smaller towns, it may not be necessary to rent rooms at all, as the board might meet in the offices of its members as occasion might require. A small sum paid to a secretary, and a few dollars for stationery, might compose the whole expenditure for a very long time, and the amount required, could easily be raised by a membership fee, and a small yearly due. Meetings might be held monthly or bi-monthly, or they might only be held at the call of the chairman, or as occasion demanded. The benefits derived by an organization, such as a Builders' Exchange, even in a small town, can scarcely be measured ; and if the builders and contractors will only pause for a moment and think over the subject, they cannot fail to see how their own interests, the interests of their workmen, and greater than all—the public interests, can be bettered ; they will seriously think that it is about time to organize a Builders' Exchange in their town.

MR. JOHN HIGMAN.

MR. John Higman, president of the Ottawa Association of Master Plumbers of Canada, and retiring vice-president for Ontario, is an Englishman by birth. Born in Cornwall in 1842, he came to Canada when thirty years of age, taking up his residence in Ottawa, where he has remained almost continuously ever since. He is

MR. JOHN HIGMAN.

a leading business man in the plumbing and steam fitting line, is a fine stalwart fellow, standing six feet and turning the scale at two hundred and seventy pounds. He directs his business with careful intelligence, while his integrity of character makes him one of the most respected residents of the city. His recognition at the hands of the master plumbers is well deserved.

A permanent liquidator has been appointed to wind up the affairs of the Canadian Granite Co., of Ottawa.

POLISH FOR BEECH WOOD.—The wood of the red beech is known to acquire, by the use of ordinary shellac polish, a dirty yellow color, and by the use of white polish, prepared from bleached shellac, an unsightly gray-white color. Therefore, where light colors are desired only filtered shellac polish should be employed, and in order to impart some fire to the naturally dull color of the beech wood the admixture of a solution of dragon's blood in alcohol for a red shade, or turmeric in alcohol for a yellow may be used. A compound of the red and yellow liquids gives a nice orange shade. A few trials will soon show how much coloring matter may be added to the polish.

WIND PRESSURE ON BUILDINGS.

THERE has been more or less discussion of late, says the Engineering Magazine, as to the proper allowance to be made for the force of the wind in proportioning buildings and other structures, and although there have been numerous cases of overturning and wrecking from the force of the wind it has been strongly maintained that the usual allowance is more than sufficient. Probably no structures offer a better mark for the wind than do gas holders, and the great bulk of such structures, together with the impossibility of securing them firmly to foundations, renders the estimate of wind pressure a matter of especial importance to engineers engaged in connection with such work. A very full and valuable discussion of this subject was contributed by Mr. J. O. T. Irminger at the recent meeting of the Institution of Gas Engineers, and his treatment was so full and broad as to be of interest to structural engineers in all lines of work.

After referring to the experimental investigations of Professors Langley, in America, and Kernot, in Australia, as well as of Herr Vogt, of Copenhagen, Mr. Irminger describes some very interesting experiments of his own, in which models of various forms were exposed to the draught produced by a chimney 100 feet high, careful measurements being made of the pressures and suctions on all sides. The results of these tests are tabulated in connection with the computed values, using the formulas of previous experimenters, and fairly consistent figures are obtained.

The influence of the sucking action of the wind is especially important, acting as it does to modify very materially the direction of the resultant for which provision must be made in the construction, and the lifting effect upon roofs and gasholders should always be taken into account.

Referring to the statement of Sir J. Wolfe Barry concerning the excessive magnitude of the Board of Trade allowance of 56 pounds per square foot for wind pressure, in connection with the Tower bridge, Mr. Irminger shows that this suction effect has much to do with the diminishing of the direct pressure of the wind, and cites an instance of the measured pressure on a large gasholder in a storm as being only 4.9 pounds per square foot.

That such measurements should not lead engineers to err on the side of too small allowances for wind pressures, Mr. Irminger gives an abstract of the computations of Mr. J. Baier, upon the wind pressures which must have existed during the storm at St. Louis, U.S.A., in the summer of 1896. The damage done by that great storm is well known, and by computing the strength of some of the structures which were overthrown the actual force of the wind was determined. Mr. Irminger states that the velocity of the wind on that occasion was about double that known in Europe, and hence of four times the force, ranging from 40 to 60 pounds per square foot.

"Such a hurricane simply rases all and everything in its path, but is fortunately not known in Europe; and, if we assume the forces mentioned by Mr. Baier are correct, it cannot be wondered at that the forces estimated in Europe are considerably less violent."

Mr. Baier's conclusions agree with those deduced from Mr. Irminger's experiments, and show that the wind acts in a direction quite different from that generally assumed and generally provided for in designing bridges, roofs and buildings. "One may thus assume that the experiments on the small models have been verified by nature itself, and that calculations of the wind's force must be made on a different basis than hitherto, inasmuch as, besides the horizontal effects, the upward force must be taken into consideration, the power of which can equal half the wind's normal pressure."

The discussion of the paper bore out the idea that until now wind pressures have been studied with rather preconceived ideas. The construction of buildings has proceeded in accordance with these ideas, and except when great catastrophes have called the attention of engineers to the failure of structures, very little seems to have been done in the way of investigation to see whether the established ideas are correct or not.

The increasing size and altitude of framed structures is rendering the question of proper allowance for wind pressure a most important matter, and the experiments made by Mr. Irminger, as well as those of others cited by him, form valuable contributions to the subject. When such buildings are being designed it appears desirable that small models be made and tested in the simple manner described, and there is little doubt that the stability of the structure during wind storms would be materially increased if such information is obtained and used in the preliminary stages of the design.

GREEK MASONRY.

THE ancient Greeks were as empirical in their rules upon the proportions of each stone they employed as upon the proportions of the whole design. Thus it may be observed, for example that the size of the stones in the Erechtheum and in the Parthenon differ in about the same ratio as the one differs from the other. For the actual proportion of the stone itself no direct rule can be given, nevertheless it is found that the geometrical ratio of 1. 2. 4. is by no means unfrequently employed, Symmetry also was considered as necessary in the position of their joints as in the composition of the plan, or the position of their triglyphs and mutules, and these may be observed as occupying the same place in nearly every similar construction. The Greek joint, whether it is executed in marble or in stone, is a thing really to marvel at. It is, indeed, scarcely visible. Its perfection arises from the amount of skill and labor bestowed upon it, and from the peculiar method of working the two surfaces. There are grounds for believing that there was a universal method adopted in all ages by that nation, nor was it confined to the Greeks alone, it having been handed down to and practiced by the Romans also, as can be observed in the Coliseum and Arch of Septimus Sevetus. It, however, at length became either lost or disused.

POINTS FOR ADVERTISERS.

THE reason a good deal of advertising doesn't pay is that it is only half done.

A manufacturer spends a lot of money advertising to the consumer, and makes no concerted effort on the dealer.

The two things must go together.

The dealer must be reached on both sides of the counter at once—by the consumer in front with his money and by the manufacturer at the back with information about the goods and about the profits that can be made by handling them.

The two things together make an irresistible argument.

Either one alone may do some good, but one is not complete without the other.

WINNIPEG MASTER CARPENTERS' ASSOCIATION.

The advantage of organization by employing contractors in the building trades are receiving greater recognition of late. The last two years have witnessed

MR. WM. BRYDON,
President Winnipeg Master Carpenters' Association.

the establishment of Builders' Exchanges in several of the leading cities of Canada. One of the latest of these organizations is the Master Carpenters' Association of Winnipeg. The association is the outcome of the recent unreasonable demand of the striking carpenters in that city.

Although at present solely composed of master carpenters, the purpose is that the organization shall be established on the broader basis of a Builders' Exchange, representing all branches of the building trades. The association occupies a suite of rooms in the McIntyre Block, in the most central portion of the city, and is under the government of the following excellent staff of officers: Mr. Wm. Brydon, president; Messrs.

MR. JOHN A. GIRVIN,
Vice-President Winnipeg Master Carpenters' Association.

John Girvin and S. B. Ritchie, first and second vice-presidents; Mr. J. G. Latimer, treasurer; G. A. Mitchell, secretary; James McDermid, chairman of the executive. The membership fee is $25; dues, $6 per annum. We are privileged to present herewith the portraits of the executive officers of this new and energetic association, which in a short time will no doubt greatly develop in strength and usefulness.

GRANITE AS A BUILDING MATERIAL.

Notwithstanding the existence in the provinces of Quebec and New Brunswick of granite of excellent quality, the material has not hitherto been employed to any considerable extent for building purposes. This may be attributable to the fact that in the vicinity of Montreal there were extensive deposits of limestone and in New Brunswick and Nova Scotia there is an abundance of building stone. From the Maritime Provinces, however, large shipments of granite have been made to New York and Boston, and also to Scotland, the home of the granite industry. We have understood that a portion of the material thus exported was to be employed in building construction. Recent events seem to indicate that our native granites are likely to enter more largely into building construction in the future than in the past. The limestone quarries in the vicinity of Montreal are said to be so far exhausted that it is no longer possible to obtain stone of large dimensions or uniform color. Even in its best days this stone was unattractive in color and its extensive use in Montreal can only be accounted for by the ease with which it could be obtained and its consequent cheapness. For the first storey of the new Grand Trunk Railway offices, Stanstead granite has been

METHODIST CHURCH, STANSTEAD, QUE.

employed, and the architect is reported to have said that he would have built the entire structure of it had he known that the material was obtainable in the required dimensions and quantity.

In color Stanstead granite is a bright, clear grey. In rock-faced work it gives a bright sparkling effect. In hammered work it shows nearly white and stands out distinctly in mouldings and carving. Blocks of any size up to 40 tons weight are obtainable and the quarries are fitted with appliances for handling them. The shipping facilities are excellent, the quarries being reached by a branch line of railway by which connection is made with the G. T. R., C. P. R., B. & M. or M. C. railways.

The strength and enduring qualities of granite are too well known to require special mention. On this point Prof. Coleman, of the School of Practical Science, Toronto, says: "Having carefully examined a specimen of grey Stanstead granite, I find that it contains no iron pyrites nor other sulphide which on weathering would give a brown stain in the stone."

Hitherto the cost of working granite has been against its use for building purposes in this country, but of late by the use of machinery this drawback has to a large extent been overcome. It is claimed that by means of improved quarrying facilities and stone working machinery operated by compressed air, it is now possible to offer this material at a very slight if any advance on the cost of other varieties of building stones.

The accompanying illustration of the Methodist church at Stanstead, constructed of granite from the local quarries, will serve to show the appearance of the material in situ.

VANCOUVER BUILDERS' EXCHANGE.

We present herewith portraits of the executive officers of the new Builders' Exchange at Vancouver, B. C. Some particulars of the organization of this Exchange

MR. E. COOK,
President Vancouver Builders' Exchange.

were supplied in a letter from the secretary published in our July number.

The constitution shows the Exchange to be founded on a somewhat different basis, as regards terms of membership, from organizations of like character in Eastern Canada. For the information of those of our readers who are interested in the builders' exchange movement, we reprint from the constitution of the Vancouver Exchange the sections relating to Membership, Fees and Dues, as follows :

MEMBERS.—" Section 2. Should any member of this Exchange make an assignment or in any way fail in business to the manifest injury of his creditors, this Exchange shall pay to his creditors pro rata a sum equal to 90 per cent. of his share of the invested funds of the Exchange. He shall be suspended and shall forfeit all privileges of the Exchange until such time as he shall have recovered so as to re-enter the Exchange as provided by the Constitution and By-law, in which case he may be reinstated to all the privileges of the Exchange.

MR. A. E. CARTER,
Secretary Vancouver Builders' Exchange.

Section 3. Any member in good standing may withdraw from the Exchange upon giving thirty days' notice, which notice shall be posted in the Exchange rooms. He shall be entitled to receive from the Exchange a sum equal to 90% of his share of the invested Exchange funds.

In the event of the death of a member in good standing, his share of the invested funds of the Exchange shall be paid to his legal representatives.

FEES AND DUES.—" Section 1. Applicants for membership shall deposit the sum of $12.00 with the Exchange, as an application fee, which shall be returned if the application is refused, and taken as the first payment of dues if the application is accepted. If the applicant is elected, he shall be notified to that effect and that he is required to pay into the Exchange funds the sum of $300.00 as a membership fee within thirty days, when a membership certificate shall be issued to him.

Section 2. The membership fee shall be invested by the Exchange as an accumulative reserve fund, to be drawn upon only in case of the withdrawal, the assignment for the benefit of his creditors, or on the death of a member.

Section 3. Each member shall pay as dues twenty-four dollars per year, payable semi-annually in advance, on the first days of November and May. Any member three months in arrears for dues shall be so notified by the Secretary. If the dues of such member be not paid within thirty days from the receipt of such notice, his name shall be reported to the Board of Directors, who shall investigate and institute proper proceedings to collect the amount in arrears."

It will be seen that the terms of membership are a guarantee to some extent of the business probity of the members, amd this must influence architects and building owners to give preference to the contractors who are members of the Exchange, as against contractors whose responsibility and reliability is not thus assured.

MR. H. A. BELL,
Treasurer Vancouver Builders' Exchange.

The following are the rules of the Exchange :

1. These rooms shall be exclusively for the use of members of the Builders' Exchange, and shall be at all times under control of the Board of Directors, who may upon application therefor, grant to trade organizations (two-thirds of whose members are members of the Exchange) the use of such rooms as in their judgment may seem proper for the holding of committee or other meetings.

2. Visitors shall not be admitted, except on the following condition, viz : They will inform the Secretary who they wish to see, and if the member so notified desires to invite the visitors upon the floor he may do so, with the understanding that he will be responsible for their proper conduct while upon the floor, and that they will promptly retire after they have transacted their business with said member.

3. Any member of the Exchange in good standing may introduce "non-residents" as visitors to whom the Secretary is authorized to issue cards of admission to the Exchange rooms, good for one week, provided, however, that said visitor shall first register his name in the visitors' book, and shall not be allowed to exhibit any sample of goods, wares or merchandise of any kind, or transact any business whatever in the Exchange.

4. The Exchange rooms shall be kept open during the usual business hours, viz : from 8 a. m. until 6 p. m., holidays excepted.

5. The Exchange rooms shall not be used by any members as an office for payment of employees, nor will workmen be permitted to solicit employment at these rooms.

6. The following named persons will be cheerfully admitted to the floor upon making themselves known to the Secretary, viz :

(1.) Architects and draughtsmen.
(2.) Government and city officials.
(3.) Building inspectors.
(4.) Retired master-builders, to whom complimentary invitations have been voted.

Persons admitted under this rule will not be permitted to make appointments to meet other than members of the Exchange in these rooms.

7. The Secretary will not be permitted to give receipt for any money, checks, drafts or negotiable papers (the law appearing to make the Exchange directly responsible for such receipts). Should parties desire to have such money, checks, etc., placed in the boxes of members, then the Secretary may do so, with the understanding that the Corporation shall not be held for any loss that may occur.

8. No advertising cards or wares of any kind shall be displayed in the Exchange rooms, except by permission of the President.

PLUMBING SIMPLIFIED.

IN a brochure bearing the above title, Mr. Wm. Paul Gerhard, C.E., consulting sanitary engineer, of New York, says :

I am to-day more than ever in favor of simplifying the plumbing work of buildings. Anything that helps to reduce the present complicated system of piping, while at the same time retaining the safety of the system, seems to me to be worthy of serious consideration.

When using the simple S-trap, I provide, as everybody else does, the "back air pipe" necessary to render this special form of trap safe against siphonage. But I have long ago come to the conclusion that branch pipe ventilation is carried much too far ; that instead of giving positive security, it creates new and sometimes serious dangers, and that it also entails an unnecessary and useless expenditure of money. I hold it is imperative that this matter be seriously considered by unprejudiced and unbiased experts and sanitarians.

Briefly stated, the objections to the trap vent law are as follows :

(1) The venting of traps leads to a greater, and sometimes dangerous, complication of the work.

(2) It involves a useless outlay of money.

(3) It increases, and often doubles, the number of pipe joints in a building ; it duplicates the pipe system, and therefore increases the danger of leakage at the joints.

(4) Trap vents attached to the horns of porcelain fixtures, such as water closets, often lead, in case of settlement of the building, to the breakage of these horns, thus opening up a dangerous inlet for sewer air, the crack often remaining unnoticed for years.

(5) The mouth of the vent pipe at the point where it attaches to the crown of the trap is liable to clog up with congealed greasy deposit, rendering the vent pipe useless without this fact becoming apparent to the occupant of the house.

(6) The upper end of the back air pipe, where it extends separately to the roof, is liable, unless enlarged to at least 4 inches in diameter, to be closed up with snow or hoar frost in winter time ; in very cold climates even a 4-inch pipe may become sufficiently obstructed by hoar frost or icicles to impede seriously the free ventilation of the vent pipe.

(7) Owing to the increased air current passing over the water seal of the trap, and induced by the vent pipe, the destruction of the water seal by evaporation is much more rapid.

(8) The trap venting system affords increased opportunities for bye-passes in the case of careless or ignorant workmen. In my examinations of the plumbing of houses, I have discovered bye-passes even where such work was done under board of health inspection.

(9) In the case of long vent pipes, particularly where there are several sharp bends in the pipe, the friction of the air passing through the pipe is sometimes increased to such an extent that the vent pipe fails to protect the trap from siphonage.

" But," say the advocates of trap vent pipes, " these pipes are not only put in to prevent siphonage ; they are intended equally to ærate the branch waste pipes and to produce a circulation of air in the entire system of branches." To this I reply that plumbing work can and should be always skillfully arranged and planned, so that the fixtures are located immediately adjoining well-ventilated soil or waste pipe lines. If thus arranged, the short branches are so well flushed by the frequent discharge from the improved modern fixtures with large outlets—each of which constitutes in itself a small flush tank, and only fixtures having these desirable features should be considered at all—as hardly to require any other purification or æration. Just the moment, however, the branch wastes become long, owing to the location of the fixtures, I always insist upon the proper ventilation of the branches by continuing the lateral wastes the full size into a vertical line, which is carried up to the roof the same as the soil pipe.

In conclusion, I hold that the authorities who make the plumbing laws should keep themselves thoroughly posted about the progress of the art, and should examine, without fear or favor, all devices calculated to preserve and maintain a sound water seal against any possible air disturbances in the soil pipe system.

I claim that the rules drafted should be such as to secure a system which is as simple and economical as possible consistent with security and efficiency. Security against back pressure, self-siphonage or loss by momentum, siphonage, evaporation and loss of seal by capillary attraction are the chief requirements, and these are unquestionably attained by the method described. If the process of simplification should tend to give us even greater security, so much more will be gained. Caeteris paribus, the simplest and least costly system must necessarily be adjudged the best.

The trap-vent law will, in my judgment, ultimately be repealed. Simpler and better methods will take its place. The first initiative step to be taken consists in so modifying the present law as to leave the option with the owners, architects or sanitary engineers of buildings to choose between the simpler, better and less expensive, advanced method, or the antiquated, costly, and in a good many respects unsafe method.

Paradis & Letourneau have registered as proprietors of a brick manufacturing business in Quebec.

At the annual meeting of the American Society of Heating and Ventilating Engineers, held in New York, one of the topics discussed was, " What is the practical experience as to the loss of heat from hot air flues, especially when located in outer walls ? " A written discussion from H. Elsert was to the effect that the loss was 15 per cent. greater when the flue was in an exposed northern wall than when in a southern wall, under the same conditions.

HOW A NEW BUSINESS HAS GROWN.

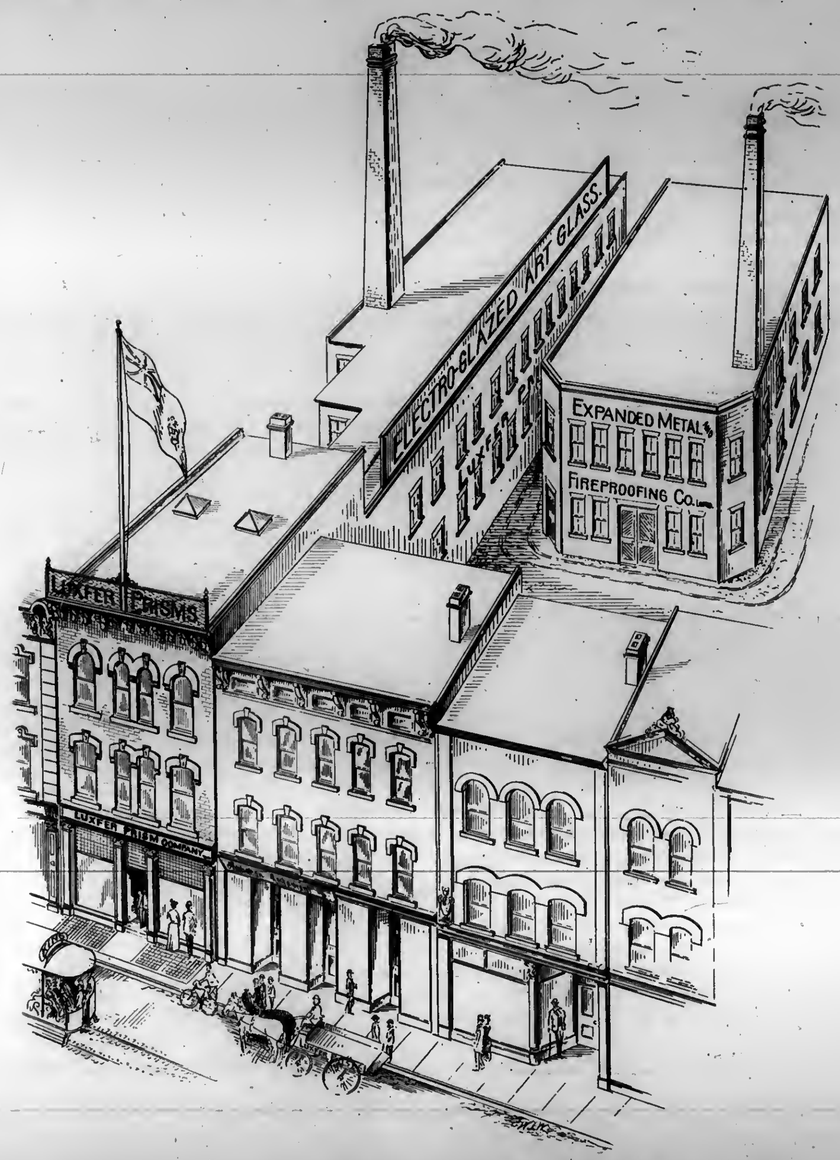
Seldom does a concern of the magnitude of the Luxfer Prism Co. Limited attain thereto in so brief a time, and from a beginning so modest. There is a vast deal in having merit in the product. How Luxfer Prisms faciliate the endeavor to secure good daylight for store and office buildings, otherwise doomed to darkness, the architects themselves best apprehend. It was a case of experimenting at first, with the result that now Luxfer Prisms are included in the specifications of every important new building.

"Advance" will be the motto of the new company, which—with a largely augmented capital—recently acquired the business of the old one.

The battery of electro-glazing tanks in the new and specially designed King street factory quadruples the capacity of the present one. In every way the extensive plant will be thoroughly equipped both for prism work and ornamental electro-glazing.

This year the Luxfer Prism Co. makes a most interesting exhibit at the Industrial Fair, next north of the Rice Lewis Co's. old established stand. Their building will be lighted with Luxfer Prisms and plate glass, and the contrast between the two as a means of lighting interiors will be strikingly displayed.

The company extends the most cordial invitation to old and new friends to visit them either at the Fair grounds or in their fine new premises, Nos. 98-100 King street West. To architects especially a hearty welcome will be given, and a new and noteworthy exhibit of ornamental iron work, pressed brick, and other high-grade building materials—for which a new-horn, but healthy demand exists in Canada—will be presented for their delectation, in addition to the important Luxfer features in prism work and art glass.



New Offices and Factory—Luxfer Prism Co., Limited—98-100 King Street West, Toronto.
(Extending to Pearl Street.)

TESTS OF ARMORED AND IRON DOORS.

The first of a series of tests of the fire resisting qualities of doors was made recently under the direction of the London Fire Prevention Committee. An iron door and a wood door covered with tin plates were the subjects of the first test. The doors were obtained in the open market, the armored door, being fixed by its maker, was hung to fit closely against the face of the brick wall, and had a 3 inch overlap both at the sides and at the top, as measured at the centre. The iron door was hung in a rebated frame. Both doors opened inward toward the fire. The door openings were approximately 3 ft. 9 in. by 7 ft. 3 in. The object of the test was to record the effect of a fierce fire of one hour, gradually increasing to a temperature of 2000° Fahr., followed suddenly by the application for five minutes of a stream of water.

The result is summarized as follows :

Armoured Door.—All the woodwork between the tinned steel plates was wholly reduced to charcoal, and had fallen to pieces within the steel casing.

The tin was melted off the door.

Some of the plates were forced out of position and the welted edges opened.

The steel plate casing was considerably bulged on the fire side, and also on the outside, so that the distance taken at the center between the inner and outer casing was 9½ in.

Iron Door.—The iron-framed and panelled door had buckled and warped, as had also the rebated frame in which it was hung.

The door had fallen over at the top corner on the lock side to the extent of 4⅛ in.

The rebated frame had bulged to the extent of 2⅞ in. from the vertical straight line.

No further observations were made.

CEMENT DETERIORATION.

Attention has recently been drawn to peculiar cases of comparatively rapid cement deterioration under obscure conditions. Thus, Stutzer and Hartleb report a case of a reservoir which, within three years, became covered with a soft brownish mud, while the concrete underneath proved permeable. On analysis it was found that silica, iron and alumina seemed to have increased in proportion, whilst the percentage of lime had decreased. Evidently some lime had been dissolved, so that the percentage of the other constituents was apparently augmented. In some cases this would be ascribed to the action of carbonic acid. Exhalations of this gas are common in the Rhenish district, where some of these deteriorations have also occurred. In other instances, any action of carbonic dioxide looked improbable; and, no other cause being traced, the suggestion of some bacteriological activity did not appear altogether absurd. In one of these cases ammonium sulphate was added to the water. It was gradually transformed into nitrite, all ammonia disappeared, and nitrite of calcium—a readily soluble compound—was formed. A microbe was also discovered.

RECENT IMPROVEMENTS IN ART GLASS.

Electrolytically glazed art glass is now upon the market at practically the cost of the leaded work. Samples of this specialty of the Luxfer Prism Co., Limited, Toronto, are to be viewed in the new steamer Toronto, just built by the Bertram Engine Works Co. The copper lines are slender and tough, and no disfiguring saddle bars divide the panels into sections. A rigidity before attained only by copper bar or some other expensive mode is at the same time a prominent characteristic. Messrs Bond & Smith, architects, supplied the design, which is Moorish in treatment and refreshingly attractive.

In addition to securing its due share of the general run of decorative glass, the Luxfer Prism Co. has already established an enviable reputation for supplying, at reasonable cost, panels to resist strains due to sudden concussions, as in book cases, door and transom lights, etc. The future of electro glazing is promising.

The master carpenters of Toronto have recently formed themselves into an association in affiliation with the Toronto Builders' Exchange. Mr. John Hanrahan is the president of this new Association, and Mr. George Henry is the vice-president. An Executive Committee was appointed comprising these gentlemen and five other members of the association.

A charter of incorporation has been granted to the Expanded Metal Company of Canada, Limited, with headquarters in Toronto and a capital stock of $100,000. The purpose of the company is to sell and deal in expanded metal, and carry on a general fireproof construction business in Canada. The names of the following persons appear in the charter: Charles Waldo Adams, manager Edwards Railway Electric Headlight Company, Chicago; William Wilson Ramsey, president Expanded Metal Fireproofing Company, Chicago; Chapman Jay Root, bottle glass manufacturer, Chicago; James Henry Barnard, lawyer, Chicagn; Ebenezer Forsyth Blackie Johnston, barrister-at-law, Toronto; Charles Samuel Spencer, building constructor, Rossin House, Toronto.

Masonic Coat-of-Arms, Masonic Room, Temple Building.
By W. J. Hynes, Toronto. G. W. Goudlock, Architect.

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LEGAL

SCANLAN VS. DETROIT BRIDGE AND IRON WORKS.—In this case argued and decided recently in the Superior Court at Montreal, Mr. Justice Archibald, presiding, the Judgment was as follows:—The plaintiff sues the defendant, alleging that he was a bridge builder, employed in the defendant's service in the building of the new Victoria bridge across the St. Lawrence, from Montreal to St. Lambert, at the salary of $2.50 per day; that on the 2nd of October, 1898, plaintiff with other workmen was employed in removing the iron floor of the old Victoria tubular bridge, under the orders of their foreman, and it was his duty to fasten the hooks upon the cross-beams of the portions of the floor which were to be removed, which were then by means of a derrick lifted and carried over and piled on one side of the new bridge. These pieces of flooring of the tubular bridge were six or seven feet wide by the width of the bridge, and had two cross-beams, which existed in old bridge bolted to the plate iron, which formed part of the tube. The chain, which came down from the derrick, was provided at its lower extremity with two short chains, having at each end, hooks, or rather clamps. These hooks, or clamps, were then attached by the workmen by placing them under the flange, which existed upon the cross beams, whereupon, when the power was put on these clamps, would tighten upon the cross beams and so raise the whole piece of iron to be removed. However, as the derrick had to work among the braces of the new bridge, the boom of the derrick could not swing over so as to carry the iron sideways. For this purpose it was necessary to have a second derrick provided with a chain, which was also hooked into the ring of the other chain, which was attached to the chain of the other derrick. When the iron had been raised some feet by the first derrick the strain was gradually transferred to the chain of the other derrick and just as that chain took the strain, the chain of the first derrick slacked, thus enabling the iron to be carried sideways, so as to come perpendicularly under the boom of the second derrick, and be there deposited upon the pile free from the tracks of the railway.

It seems that the workmen found it difficult to prevent the hook of the chain of the second derrick from slipping out of the ring, while it was being hoisted by the first derrick, and so the men were in the habit of riding upon the iron so as to be in a position to keep the hook of the second derrick in its place. They would then ride over until the iron was deposited on the pile. When this operation was being accomplished on the day in question the plaintiff was standing between the two cross-beams holding on to the chain of the derrick. As the strain was put upon the chain of the derrick one side of the iron lifted before the other, and just as the iron was about to be completely suspended one of the bolts which bolted one of the cross-beams to the plate iron gave way and these cross-beams naturally fell together and injured the plaintiff, who was standing between them.

The defendant says that frequent warnings were given to the men not to stand between the cross-beams, and that the plantiff disregarded these warnings, and that if he suffered it was his own fault. It appears however, that it was necessary for the men to be on the piece of iron, which was being moved, at least after it was completely suspended on the derrick chain, in order to attach the chain of the second derrick. It is manifest that the danger of accident would be just as great whether the men were standing between the cross-beams or not, because the chairs and pulleys with which that work was performed would if they gave way, in all probability kill or seriously injure any men who were working with them.

It is not the duty of an employer to guarantee the lives and limbs of the men acting under his orders, but it is the duty of an employer to use means as safe as are praticable in the performance of his work. If there was any danger in standing between the cross-beams when the iron was being hoisted that danger ought to have been known to the employer, and presumably was known to him, seeing he alleges that he had warned the employees against standing between the beams.

It is manifest that other means might easily have been employed to prevent any danger arising from the giving way of materials in connection with the removal of that iron. An employer has no right to use means which offer a constant danger to his emyloyees when other means, perhaps a little more expensive and a little slower in operation, would have avoided the danger, nor can he excuse himself by alleging that he had warned the employee of the nature of the danger which he was running.

The accident of which the plaintiff complained was caused by what I must hold to be the negligence of the defendant, and it follows that judgment must go in plaintiff's favor.

I assess plaintiff's damages at the sum of $750, for which I give judgment with costs.

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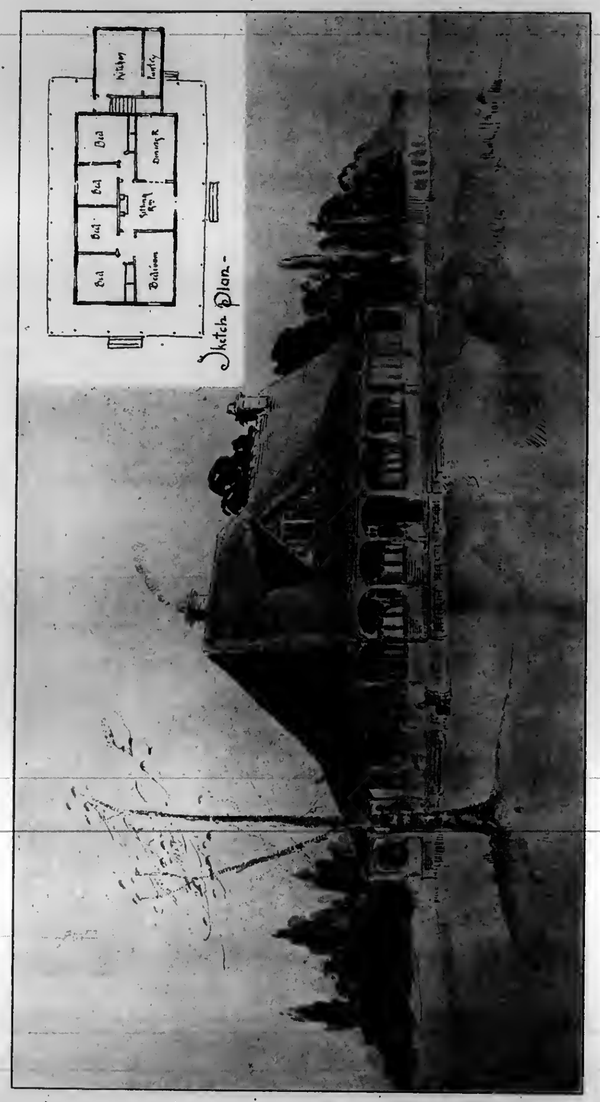

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VOL. XII.—No. 9. SEPTEMBER, 1899 PRICE 20 CENTS. $2.00 PER YEAR.

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CANADIAN ARCHITECT AND BUILDER,

A Monthly Journal of Modern Constructive Methods,

(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD).

PUBLISHED ON THE THIRD WEDNESDAY IN EACH MONTH IN THE INTEREST OF

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The C. H. MORTIMER PUBLISHING CO. of Toronto, Limited,
Publishers,
Confederation Life Building, - TORONTO, CANADA.
Telephone 2362.

Branch Office: NEW YORK LIFE INSURANCE BUILDING, MONTREAL.
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The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to foreign subscribers is $2.50. Subscriptions are payable in advance. The Journal will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrears of subscription paid.

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Method of Testing the Color of Building Stones.

IN order to ascertain the permanence of color of building stones, Prof. W. B. Clark, Chief of the Geological Survey of Maryland, tested rectangular specimens from 1 to 1½ inch in diameter, by first drying out all the contained moisture by means of a water bath at a temperature of 212° Fahr. After being allowed to cool the specimens were weighed. They were then placed upon a set of glass shelves standing in a porcelain pan containing strong hydrochloric acid. An open bottle containing nitric acid and one containing hydrochloric acid and black oxide of manganese were placed close by, and the whole covered by a bell glass, forming an air-tight chamber. After a period of seven weeks the stones were removed and washed, and the change in color, if any, was noted.

Architectural Excursion.

THE members of the Architectural Association of London make a yearly excursion in a body to places of architectural interest and bring home sketches and photographs of buildings, bits of detail and other objects which appear to them to possess merit and value. The idea has much to recommend it. Members of the profession meet each other in an informal way, talk over matters of mutual interest and compare notes. At the same time a record is being established of the most nteresting works of architecture existing in Great

Britain and contiguous countries. Such an annual outing tends to keep alive the interest of the members in the progress and welfare of the art, and to direct public attention to the subject. While the great distances which separate many of the cities of Canada and the United States would be somewhat of an obstacle to the adoption here of the architectural excursion idea, yet we believe the experiment might with advantage be tried of holding such an excursion at perhaps less frequent intervals. Everybody takes a pleasure excursion occasionally; why should not men who have interests in common arrange to do at least some of their sight-seeing in company?

The Architecture of Canadian Summer Resorts.

As the beauty and health-giving atmosphere of the Muskoka and Georgian Bay districts of Ontario have become more widely known, their popularity as a summer resort has rapidly increased. It is admitted by all who have visited the locality that no more beautiful or healthful spot can be found on this continent. The selection of Gravenhurst as a site for a consumptive sanitarium is a sufficient testimony to the health-giving properties of the air in these "highlands." It is subject of regret to the visitor to this region that the architecture of the majority of the hundreds of summer residences on these lakes of Muskoka, bears so slight relation to the beauty of their natural surroundings. This applies not only to the cheaper class of cottages, the expenditure on which would perhaps not permit of a more artistic treatment, but also to residences of a more costly and pretentious character. Where Nature has so well done her part, the architect and builder should strive to work in harmony with her. We hope to illustrate at an early date a house erected during last summer on Lake Joseph which is in pleasing contrast to many of its neighbors, and which we trust will prove an incentive to the erection of others of equally pleasing character. If the designing is placed in proper hands, it is possible to have a house that shall express character and charm at no greater cost than would be necessary for a commonplace structure. This statement is equally true whether the building be required for residence or other purposes and whether situated in city, town or country.

Technical and Art Education.

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The Poles seem to be more successful than we in the art of making doors and windows, but their system of heating leaves something to be desired. To put the matter briefly the art of heating a house consists not in warming the air that is in the house and keeping it from getting out, but in supplying new warm air to take the place of that which is in the house, as fast as it cools or escapes. We want the air to escape as fast as it is used, and as we cannot exactly accomplish that ideal—which would amount to breathing in air from the room and breathing it out up the chimney—we must aim at the next best thing, to keep up such a withdrawal of old air and introduction of new air as will in the course of any given time effect the introduction of fresh air sufficient to dilute that which has been vitiated by respiration so as to maintain a certain standard of purity.

The heating question is therefore really a problem of ventilation; the introduction of warmed air. As in summer we ventilate our houses in order to cool them, so in winter we must ventilate our houses in order to warm them. This is scientific heating. Whether the system be steam, hot water or hot air is immaterial to the genera scheme, and will vary according to internal considerations of convenience and cost. But inasmuch as indirect radiation by steam or hot water costs more than is usually applied to the heating of an average house, it will be assumed, in this endeavor to consider the subject in a practical way, that the instrument for warming our air is a warm air furnace.

It would be well if in the matter of the heating instrument we could come closer to the conditions of the Polish peasant. The great stove, which is so prominent in pictures of the interior of a hut in that country, or in the northern part of Russia, is built of brick or some similar form of clay which gives a large heating surface of a moderate temperature and, when once heated, is slow to cool and easy to keep at a temperature nearly uniform all the time. It is mainly, no doubt, on account of the nature of their stoves that the poles find it necessary to make a fire only in the morning. It radiates all day a comfortable heat, and, if by night it is somewhat cooled, that is also a condition of comfort; for the family bed is on top of it, and in bed though it is well to be warm it is not well to be too warm. In other parts of Europe, clay is the material affected for stoves. Soapstone furnaces have also been advertised in the United States, chiefly as a better means of retaining the carbonic oxide gas, which is said to be the source of our headaches, and which not only leaks through the joints of an iron furnace but will pass through red hot cast iron. This is an undoubted advantage, and if, in addition to it, we could obtain, by the use of clay material or soapstone, the soft and equable heat which is the great comfort of hot water heating, the furnace might once more be admitted into the better class of moderate sized houses which at present affect hot water. However, until some one makes the experiment and publishes results, we have no data for calculation as to the workings of a furnace of this kind, and must assume, for the purposes of this article, the ordinary cast iron furnace.

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Britain and contiguous countries. Such an annual outing tends to keep alive the interest of the members in the progress and welfare of the art, and to direct public attention to the subject. While the great distances which separate many of the cities of Canada and the United States would be somewhat of an obstacle to the adoption here of the architectural excursion idea, yet we believe the experiment might with advantage be tried of holding such an excursion at perhaps less frequent intervals. Everybody takes a pleasure excursion occasionally; why should not men who have interests in common arrange to do at least some of their sight-seeing in company?

The Architecture of Canadian Summer Resorts.

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But the nose will not help us to arrange the air supply for an unbuilt house unless we find out what quality in the air is indicated by the faintly pungent, musty smell in a room which we call closeness, and which the nose rejects as unfit to breathe. The impurities which distress us are not themselves easily measured, but they are always accompanied by carbonic acid gas, and this is easily detected and measured by the readiness with which it combines with the lime in lime water, causing the precipitation of carbonate of lime. There are many instruments for effecting this combination, and measuring by its means the quantity of carbonic acid gas present in the air. One instrument, devised by Prof. Wolpert, and described on p. 25 of "Billings' Ventilation and Heating," seems to be simple enough to be used by architects to make their own tests. It consists of a measured tube to contain a given quantity of lime water, and an Indiarubber bulb injector of a measured size, by means of which air from the room may be blown into the lime water in measured quantities. On the bottom of the glass tube is a black mark. Air is blown into the lime water until it becomes so opaque from the formation of carbonate of lime that the black mark on the bottom is no longer visible. This result has been found by the inventor of the instrument to indicate a certain quantity of carbonic acid gas; and the number of times it was found necessary to fill and empty the air bulb in order to produce this result shows the proportion of carbonic acid in the atmosphere of the room. The less number of charges of air delivered from the bulb, the greater the proportion of carbonic acid in the air.

By means of instruments of this nature it has been found that the normal quantity of carbonic acid present in the air is about 4 parts in 10,000, and that when as a product of respiration there is so much more carbonic acid added to the air in a room as to make it unpleasant to the nose, the proportion is from 7 to 8 parts in 10,000. The nose can stand without offence the addition of 2 parts in 10,000 to the normal, so that the air in a room may carry 6 parts in 10,000. Further experiment has shown that to keep the air in a living room diluted, so that the total proportion of carbonic acid shall not rise above 6 parts in 10,000, requires the introduction of one cubic foot per second per head, or 3,600 cubic feet per hour.

Accepting this standard as sufficiently established for practical purposes, it remains to find out how to introduce fresh air in such a measured quantity and how to provide for warming it. These points will be the subject of a second article.

THE FIRST TECHNICAL SCHOOL AT OTTAWA.

Under this title a school has recently been established at Ottawa, Ont., to provide instruction in art and handicraft. It is conducted on an independent basis by A. Marion Living, Werner E. H. Noffke, and Sydney B. Johnson. The courses of instruction include industrial Design, Architectural and Machine Drawing, Commercial and Pictorial Illustration.

In the Applied Design class students are taught how to make designs practicable for the printing of wall-papers, silk and cotton dress goods and draperies, oil-cloth and linoleum, the manufacture of stained glass, tiling, iron decorations, silverware and wood carving. In the Advanced Design class is taught carpet designing and interior decoration including clay modelling. Instruction is also given in architectural drawing and planning.

We observe by the prospectus that several well known architects and art workers of Ottawa have given their assistance to the undertaking by attending the Exhibitions and offering suggestions and criticisms upon the work of the students.

BY THE WAY.

Responding on behalf of the R. C. A. to a toast proposed at a luncheon given by the Directors during the recent Toronto Industrial Fair, Messrs. F. McGillivray Knowles, Wylie Grier and Gagen referred to the necessity for a proper fine-arts building, to take the place of the present art gallery at the Fair, which is altogether unsuitable. These gentlemen are doubtless correct in their opinion that the providing of proper accommodation would result in a much finer exhibit, not alone of pictorial subjects, but of the work of architects and designers. In reply the President said that the Exhibition Association were dependent upon the city council for funds with which to erect new buildings.

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Contrary to the opinion which one hears expressed by the majority, an experienced builder of my acquaintance states that he has found it possible to do more substantial brickwork in winter than in summer. He asserts that in frosty weather the mortar becomes as hard as stone, while in the heat of summer it retains to a certain extent its plasticity. The fact is recognized however that the character of mortar is seriously injured by alternate freezing and thawing.

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A pair of houses recently changed owners on one of the principal residential streets of Toronto. Not long after the new owners had taken possession, one of them set to work to built a heavy stone and wood piazza almost across the entire front of his house and extending right out to the sidewalk, thereby shutting out the view of the street which his neighbour formerly might have enjoyed from his front windows, and depreciating the value of his property by at least five hundred dollars. The Toronto Building by-law should contain a provision which would protect property owners from loss and deprivation of their privileges through the whim or selfishness of their neighbours.

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One of our largest builders some time since amused himself says The Brickbuilder, by making calculations as to how much time he would require with modern machinery and appliances to construct the great Pyramid. Our recollection is that the time was something like sixteen months. This is on the assumption that it was to be constructed of block granite, but if it were to be constructed of brick throughout, he estimated that he could contract to complete the whole inside of nine months. This would be at the rate of something less than one hundred million bricks a month.

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From The Chronicle Fire tables for 1899 it is learned that out of the many thousands of fires which occurred in the United States and Canada, 95,240 in all, during last year, sparks lighted 5,296; lightning, 3,479; spontaneous combustion caused 1,179, and there were 6,981 attributed to incendiaries. But more than 10,000 causes were referable to defective flues, which appears to rank highest in the list of causes.

CORRESPONDENCE.

TECHNOLOGY AND INDUSTRIAL ART.

To the Editor of the CANADIAN ARCHITECT AND BUILDER:

SIR,—As a manufacturer I am pleased to observe the attention given in your columns to the above subject. The various resolutions recently adopted by some of our important bodies, having been published and different criticisms advanced, perhaps a few more comments may be of use in helping to establish in our midst institutions which will prove of material value in furthering the interests of our manufacturing industries, opening up new fields for the talent of our youth, and bringing greater reputation to our country.

For years we have had our universities to turn out clergymen, doctors, lawyers, etc., colleges of music, model farms to educate the husbandman and schools for mining and engineering. At last we have awakened to the fact that we can be something more than an agricultural country, and it is to the enterprise and foresight of our manufacturers, whose interests have been the shuttlecock of governments, that a new feature in our commercial standing is to be given to the world.

We are now to have schools for the advancement of our manufacturing industries, and the value of these schools will depend on the understanding of what is required. So far they are spoken of as "Technical Schools." Looking into the term, it seems to wrongly designate the schools, or it is intended to establish the wrong kind of schools. "Technology" being the "science of arts," does not necessarily bring into use "applied art." What therefore is it, which is required? Certainly something more than a school only for the purpose of teaching plain construction of an article. Modern education and taste demand something ornamented. This is evidenced every day of our lives. To have ornament so applied as to be in keeping with the article, then, would be an important feature of the teaching in such a school. Ornament is the application of beautiful forms or colours to enrich an object. Inappropriate enrichment is not ornament.

A School of Industrial Art and Applied Design would appear to be what is wanted. Why? Because the manufactured commerce of Canada has grown to such an important position in the progress of the Dominion that it is necessary we should be able to supply from our own people the expert artisans and decorators needed in all branches of industry.

Instruction in the proper putting together of the necessary parts of an article and the tasteful finishing of it, has for some years past occupied the attention of governments in all countries. The commerce of the country is the ward of the government, and should not have it's interests relegated to legislatures or municipalities. The government, then, should have the supreme charge over all that interests so important a part of the national welfare. The buildings and lands should be owned by the government, and the supervision of the schools be in it's charge—the legislatures and municipalities taking the responsibility of equipment and teachers.

These schools should be supplied with such plant as to educate the students in the bringing of raw material to a finished article, and should encompass every branch of manufacturing industry.

So far reference is made to what is supposed to be the object of the proposed mis-named schools. But have we at present schools properly equipped for this purpose? We have art schools, understood by many and defended by others as all that are needed, but requiring only further monetary support. Manufacturers are also being blamed because they have not contributed to the support and purchased the product of the existing schools, and evidence is offered that prize-winning pupils have been obliged to leave the country and seek positions in other climes. Many of the present schools are devoting some attention to industrial design, but in many cases the result is not a practical working design, though as a specimen of close attention, graceful drawing and artistic coloring it may have taken the prize in the competition at the annual showing of all the schools' works.

Industrial drawing is one thing, decorative painting and designing is another, but applied design transcends them all. To produce a wall paper design of proper commercial value requires a knowledge of execution, including the cutting of patterns and stencils and a knowledge of blending. Interior decoration requires the production of schemes in different mediums, including treatment of walls, floors, ceilings and windows, hangings and furniture. Designs for carpets, rugs, curtains, upholstery goods, oil cloths, etc., requires a knowledge of the processes of manufacture. Designers in textiles require knowledge of the various fibres and animal products used, a knowledge of spinning them, and processes of dyeing and weaving. For wood carving and wood working, a knowledge of woods and their grains is necessary; and so on, throughout the whole category of materials used in the construction of an article.

The demand by manufacturers for certificated pupils from competent schools would very soon prove a raison d'etre for the schools, and, instead of the present want of recognition, the schools would be in need of extension.

In connection with such schools should be a museum of art, which is as necessary to their complete success as teachers.

Many other branches which should be included in the course of instruction might have been referred to here, such as modelling, architecture; chasing, etching and engraving on metals, damascening and filigree, enamelling, stone carving, embroidery, casting, leather work, fresco, lithography, etc., machine construction, steam engines, applied mechanics, etc.

"MANUFACTURER."

THE NEW YORK FIRE-PROOFING SCANDALS.

MONTREAL. 8th September, 1899.

To the Editor of the CANADIAN ARCHITECT AND BUILDER:

SIR,—The Roebling Coostruction Company, in a letter published in your issue of August, take exception to my remarks anent the New York Fire-proofing Scandal (vide June number of the CANADIAN ARCHITECT AND BUILDER) but evading every statement made therein seek by publishing two newspaper items of questionable taste and doubtful authenticity, to lead the general public (for whom they are so solicitous) astray. What bearing these can have on the New York Fire-proofing Scandal and the actions of the Building Commissioners, etc., I leave your readers to judge.

Nor are they content with this, but undertake to inform the general public I am a manufacturer of terra cotta (hard tile). Surely the advertisement of the company I represent is explicit enough "Manufacturer of Porous Terra Cotta," a material entirely different, and in its fire-proof qualities superior to either terra cotta (hard tile), or concrete.

The following extracts (not unknown, I think, to the Roebling Co.) and taken from correspondence and reports will give the general public a clear conception of the straight forward and disinterested interest of this firm on their behalf.

"Henry Maurer & Son deeming the fire-proof period, 5 to 6 hours of Mr. Constable's fourteen tests inadequate to determine the resistance to intense heat of fire-proofing material, threw down a challenge to all for a joint test of 24 hours continuous duration."

"The John A. Roebling Sons Company, in a letter to Mr. Constable purported to accept their challenge, but instead of a fire-test of 24 hours, continuous duration, proposed one of 4 hours only. This proposition was declined, and settled the whole matter as far as H. Maurer & Son were concerned."

"But, the John A. Roebling Company, under conditions imposed by themselves, and presumably the most favorable for their method, and with material procured at considerable trouble and expense, with additional tile from othe manufacturers, proceeded to erect (themselves) an end construction arch of 5 feet span in a structure adjoining a concrete arch superintended and constructed by them.

Mr. Julius Franke, architect, of New York, in his report of this test, says: "When I made my first inspection the hollow tile arch had been built, and as no concrete had then been put on top of the same, I noticed that the key of the arch was not in the centre; that tiles of different patterns, not made to be built in the same arch were used, and that some of the cement mortar which I took off the top was very poor, the same crumbling between my fingers." It did not require deep penetration to discern the result which followed. He continues: "After the fire test I examined the arch again and found that the middle third, including skew backs, had fallen, and that the two-thirds remaining had joints open at the bottom, but that most of the mortar with which the bottom of the tiles had been plastered had remained on the tiles. The concrete filling on top of the arch was very poor, not being strong enough to resist any strains. I came to the conclusion that the arch failed because it was improperly built."

A study of the results of independent tests, vide Denver tests, 1893; S. Constable's N. Y. tests, 1896; the report of S. Albert Reed to the New York Tariff Association, etc., will convincingly show that the test of which the Roebling letter treats was simply a farce.

I am, yours truly,

N. T. GAGNON.

[As no benefit seems likely to accrue to our readers from a continuance of this correspondence, it must now close.—EDITOR C. A. & B.]

Branch Office of the CANADIAN ARCHITECT AND BUILDER,
New York Life Building, Montreal,
SEPTEMBER 14th, 1899.

BUILDING ENTERPRISE.

The city Building Inspector's opinion regarding the volume of building enterprise in this city the present season is, that the expenditure is larger this year than last. A less number of buildings are being constructed, but they are of a more costly and important character. The value of the new structures is estimated at about $3,000,000. The Inspector declares that too many dwellings are being built, and that they are of too expensive a character. Sufficient provision is not made in the way of providing detached houses suitable for persons of moderate means, hence this class of persons are obliged to resort to boarding houses, flats and tenements.

DEATH OF MR. GEORGE ROBERTS.

One of the oldest and most highly respected builders of Montreal, in the person of Mr. George Roberts, passed out of life recently at the advanced age of 74 years. Owing to enfeebled health he retired several years ago from active business life, leaving as his successors his three sons.

The late Mr. Roberts, who was a native of England, took up his residence in Montreal in 1854, and thereafter resided constantly in this city, where he constructed many important buildings, including McGill University Library and the Bank of Montreal.

THE LATE MR. GEORGE ROBERTS.

The late Mr. Roberts was a member of St. George's church, a life member of St. George's Society, of the Mechanics' Institute, a life governor of the Protestant House of Industry and Refuge, and of the Montreal General Hospital.

TEST OF A FIRE-PROOF SKY-SCRAPER.

In a communication under the above heading to the London Building News, Mr. J. Rawson Gardiner, architect, of this city, refers to the effects of the recent fire in the Home Life Insurance Company's building in New York, and sums up the lessons to be drawn therefrom as follows: "(1). That one of the chief dangers a fire-proof building has to contend against is a severe fire in an adjoining non-fire-proofed structure; (2) that marble is useless to contend against fire, as demonstrated by the front of the Home Life Insurance building; (3) that the space above the terra cotta arches between the steel beams should have been filled with terra blocks, concrete, or some incombustible material; (4) that wire lathing and mortar is not to be recommended as a covering for steel construction, and, if used, should be very carefully fastened with an air space of 1 in. between the iron and lathing, so as to allow space for a good key in the mortar."

TEST OF A FIRE-RESISTING BUILDING.

About 5 o'clock on the morning of the 12th inst., fire was discovered in the office of the American Watch Co., on the 6th floor of the Canada Life Building on St. James street. The fire, presumably caused by an electric wire, was in the wood-work behind a large safe, and had gained considerable headway before the firemen arrived on the scene. The fire was so closely confined to the one room, that, although burning fiercely, it was easily extinguished with Babcocks. The heat did not penetrate through the terra cotta partitions and ceilings, and the occupants of the adjoining offices—as well as those overhead—had no idea that a serious fire had taken place in such close proximity. So intense was the heat that the wood lining in the big safe was charred and some of the papers burned.

This test is most satisfactory to the Canada Life people and their tenants, as it proves beyond the shadow of a doubt that the building is a fire-resisting structure of the highest class.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

The Council of the Province of Quebec Association of Architects have granted the Library Committee the sum of $1,000 for the purchase of new books. Mr. Venne, the secretary, has also donated $100 for this object. A catalogue is being prepared of all the architectural books in the several public libraries of the city, and it has been arranged that students shall have access to them all. The committee will not duplicate any book that is in any of the libraries at present. It is the intention of the Association to make further grants for this purpose until they shall possess the best architectural library in Canada.

Following is the agenda for the ninth annual meeting of the Association, to be held in Quebec on Saturday, the 23rd inst.:

Forenoon session to open at 10 o'clock punctually, in the rooms of the Association, city hall, Quebec. 1. Reading of the minutes; 2. Presentation of annual report of Council; 3. Statement of the Treasurer; 4. Election of officers.

Afternoon session to open at 3 o'clock sharp. 1. Motions by members; 2. Routine and other business.

A banquet will be held at the Hotel Frontenac in the evening. An enjoyable time is anticipated.

FIRE TESTING.

St. Petersburg now boasts of a Pan-Russian Fire Protection Society, organized on lines not dissimilar from those of the British Fire Prevention Committee, although fire brigade matters perhaps receive more attention there than with the English institution which deals primarily with the prevention of fire from the constructive and technical point of view.

The Russian society is, however, also now to follow the London example of creating a fire testing station, and Prince Alexander Levoff, its president, has already gone so far as to present the necessary site and building.

The scheme for this station is the result of Mr. E. O. Sachs' visit to St. Petersburg last month, and its organization is part of his project for a series of stations in the continental capitals, to be worked on lines identical with those adopted in London, but whilst the foreign stations will attend solely to matters of local interest, the station at Regent's Park will deal with matters of international importance and serve as the centre. At St. Petersburg, for instance, attention will almost entirely have to be given to improved methods of construction in the villages, where safer materials will have to take the place of thatch and matching, etc., a subject which would of course be of no moment elsewhere. The annual destruction of villages in Russia, it should be remembered, is very serious, and the national fire loss, according to Mr. Sachs, is about seven millions sterling.

Mr. Sachs expects that by a systematic organization of this kind, and a systematic international mode of procedure, with due regard to special local requirements, combined action in fire prevention will be arrived at on the same lines as we have international movements in sanitary and hygenic matters, which though they have one recognized centre (in the case of fire prevention this will be in London) yet allow independent treatment of purely local questions in the particular countries to which they refer.

ILLUSTRATIONS.

HISTORICAL PANELS IN STEAMER "TORONTO."—MESSRS. BOND & SMITH, ARCHITECTS: EXECUTED BY MESSRS. BAILEY & OBEN.

These panels are in the main entrance hall of the R. & O. steamer "Toronto," and form part of a Canadian historical frieze in old ivory finish low relief. This frieze surmounts a high mahogany dado, and is combined with it by double mahogany Ionic pilasters. The frieze was designed as part of the decorative scheme by Messrs. Bond & Smith, architects, who also designed the entire interior decorations and furniture on the steamer.

The panels were modelled by Mr. Geo. Bailey, of Bailey & Oben. Much credit is due to Mr. Bailey for the clever way in which he has handled the work, the first of its kind in Canada.

INTERIOR OF NEW ROYAL HOTEL, HAMILTON, ONT.—W.P. WITTON, ARCHITECT.

The interior of the hotel has recently been completely remodelled. All plumbing has been replaced, numerous bath rooms put in in connection with bed rooms, and every room decorated. The whole hoase has been refurnished, steam heating and electric light have been installed, and in main hall, bar, reading room and dining room, all plaster work and finish have been replaced. The floors of ground floor, bar and lavatory are mosaic, the wainscot of main hall Mycenian marble, and bar is furnished in mahogany. The main entrance on James street opens into a spacious rotunda with mosiac floor, marble pillars and wainscot and mirrors of plate glass. On the left hand side is the office, with the main entrance and elevator immediately in rear. The staircase is in marble and elaborate open brass work. The elevator is enclosed in elegant grill work. To the right of the rotunda is the reading room Mycenian marble. By the reading room are the news and telegraph office, cigar stand and barber shop. The crowning feature of the rotunda is the palm house with its panelled and arched ceiling, extending into the second or third storey, and enriched by ornamental plaster work.

Directly in rear of the rotunda are the entrances to the main and auxiliary dining halls and the hallway to bar. The dining hall is finished in quartered white oak with parquetry floor of same material, and has a high vaulted ceiling, in panels. The panels are deeply set in enriched borders, and all combine to make an elaborate arch from end to end of the room. Marble columns support the vaulted ceiling, and the walls are set in plate glass. The lighting is done by means of incandescent lights at the base of the arch and hidden from view from the floor of the hall by rich plaster work, all executed by a well-known local firm, Messrs. John Clapham & Son. Against the wall all round the room are pilasters, corresponding to the enriched columns, and the spaces between the pilasters are wainscoted. The woodwork throughout is selected and quartered oak. Adjoining the main dining hall and connected with it by four large, double doors is the auxiliary dining hall finished in quartered sycamore.

STAINED GLASS WINDOWS IN NEW MUNICIPAL BUILDINGS, TORONTO—DESIGNED BY MR. ROBT. MCCAUSLAND.

An illustration of the large stained glass window, which occurs opposite the principal entrance to Toronto's new municipal buildings, appears for the first time in this issue. About three years ago, in response to a request, a number of designs were submitted for the work, from among which Mr. Robt. McCausland's design was selected, to whom also was intrusted the execution of the glass. In the provision for stained glass, under the specifications, it was the intention to have all of the windows in the main entrance of equal quality, but the architect wisely decided to simplify the others and have a special feature made of the great central window which occupies so commanding a position as seen from the main doorways—hence, without additional outlay a window of consummate beauty is the result. The colour scheme of the glass has been handled with evident fore-knowledge of the requirements, for where accentuation is needed it is happily managed, as for example the brilliant colouring of the Dominion flag, which is placed in the immediate centre of the composition and defines the line of demarcation between the civic and county sides of the building. Numerous lifesize figures, illustrating "The Union of Commerce and Industry," forms the principal theme of the design. In the central panel are two figures, one a female, typifying "Commerce," wearing a civic crown, the Canadian ensign occupying her left hand, while her right is clasped in that of "Industry," which is symbolized by a stone-carver who stands on the steps of a dais. Behind him are his co-workers, the carpenter, ironworker, labourer, &c. The figures in the left panel represent Europe, Asia, Africa and Australia, each bearing a distinguishing trophy, and further exemplifying the extent of Toronto's commercial intercourse.

Building and shipping industries are shown by views of the old and new City Halls, and distant vessels; while across a broad expanse of sea the sun bursts forth with far-reaching rays of prosperity. The city arms occupy the upper central panel, on either side of which are seated figures indicative of "Peace" and "Honour."

The Romanesque ornamental details of the glass are conspicuously well designed, and being executed in monotone, the more salient features of the design are thus brought into forceful prominence.

The window is of colossal dimensions, each of the three panels measuring about five feet across, its total height being about twenty-four feet. This work marks an epoch in the history of stained glass in Canada and cannot fail to be regarded as one of the most important windows on the continent.

The attention of our readers is directed to the advertisement in another column referring to a newly published work on plumbiug and heating, for which Mr. Thos. Henry, Toronto, is the Canadian agent.

WALL PAPER PASTE.—A paste with which wall paper can be attached to wood or masonry, adhering to it firmly in spite of dampness, is prepared, as usual, of rye flour, to which, however, are added, after the boiling, eight and a half grammes of good linseed oil varnish and eight and a half grammes of turpentine to every 500 grammes.

CLEANING OLD BRICKS.—A correspondent of one of the London architectural papers, in describing his method for cleaning old brickwork, states that after the joints were raked out he had a mason tool the whole face of the brickwork. This, he states, was not costly, but was effectual, as mere scraping would not answer the purpose. Afterward, the brickwork was rubbed down and pointed. Another correspondent discussing the same question stated that he had employed a liquid paint remover, called "Lithicum," which he diluted with water, and after using was washed off with hot water, the work being finally gone over with a wash of vinegar and water.

THE TEACHING OF INDUSTRIAL ART.

The following correspondence took place recently between a former student and teacher of the Ottawa Art School who is now the principal of the First Technical School of Ottawa, and the manager of a well known manufacturing company, who has manifested a deep interest in the development of industrial art in Canada:

193 Sparks St., OTTAWA, August 31st, 1899.

DEAR SIR,—Your letter of the 28th makes me wish to write a careful and perhaps lengthy reply, as it touches on a subject in which I am deeply interested and about which I am at this moment in some doubt. I answer your last paragraph and question first—I do consider you have reason for objecting to the Canadian schools, and had you been educated in an Art School expecting the teaching there to fit you for using an artistic talent for the profit (financial) or pleasure of those who worked hard to give you this education, you would be still more decided in your objections. My experience has been of such a nature that I think I am right in saying that I have the proper evidence for considering that the Art School system of Ontario is so wrong that every school is a stumbling block in the path of art and unconsciously dishonest when it undertakes to teach any child or adult submitted to its care. This may be too strong—I wish I had the opinions of others who have had my experience, but I shall give a proof in the effect of a system of work as nearly opposite as I could make it to that prevalent in other schools. Last October I start- a school here with the aid of two young men who were almost as interested as myself in this idea. I had been educated in the Ottawa Art School, spent all the time I could in studying there during eight years, worked harder and more steadily than any other student, being the prize winner in all the different branches at different times. The last few years I was pupil teacher.

I had grown to be so fond of the institution that it was not easy to awake to the fact that it was a sham, and that my success there was no evidence of real success, but I had to awake through the means of reading and a visit to New York, and the effort to support myself. I tried hard the last two years to make the Ottawa Art School a success, but at the end of May, 1898, I decided to leave for many reasons, chiefly because I could do nothing there to avoid the same result on other lives as I had experienced. I knew where the mistakes were and knew the remedies.

In October we (the three teachers) opened our School with no aid of any kind. Our students were, with three exceptions, quite unused to drawing except by themselves "for fun" —those three exceptions had had a few months' lessons from me in the old school. Some had hardly ever touched pencil or brush even. The result of our teaching was that in Toronto our school work was given more room than any other, and when we told some art teachers present that it was the work of first year pupils, they—well I think they don't really believe even yet that we didn't do most of the work ourselves (as teachers sometimes do). The fact is that there was hardly a line of teachers' work in the whole collection, and none in those they were most surprised by. I hope this is not too much writing about seemingly personal matters. It is necessary for you to know of this work before I answer your other questions.

To return to your letter.

Here is this school—successful in every way beyond what I expected, started to avoid the dishonesty of teaching under false pretences. We have tried to find out if our students can expect to get work in Canada—all summer we have written and visited different manufacturers. The reply is, "Designing should not be undertaken except by those who positively can't keep themselves away from it because they love it so much—and then they must expect to go the 'States' to earn their living." That was the kindest and most interested answer we received. What shall we do? I cannot educate clever Canadians to go over to the United States, nor can I lead them to think it worth while to study industrial art for Canada in the face of the replies received.

I have made time to do two ingrain carpet designs for the purpose of showing them to you, so that I may know whether they are technically correct, and if there would be any chance of doing such work in our school. At least this one opening I know of should be tried before I give up the central idea of our school. The classes for mechanics are all right, and for amusement and financially, the school could get along with those perhaps—but that does not satisfy us, and always those who really work are those who wish to support themselves. I shall send the ingrains for criticism, and as you ask can we "meet the case by showing really desirable things not only to enable you to show original good designs, but bring credit to ourselves, our school, and Canada?" all I can answer is—I wish we honestly could. To do it myself I would need to give up the school, and I have nothing to support me while I would be trying to get to the point. To teach beginners might be cruel and unjust, for the answer might have to be, as it has been from so many manufacturers, after they had worked hard—"Our designs must come from Paris, Vienna, Dresden or London." Is this true? Does a manufacturer need to use only Paris designs, etc., simply for the name, or could a Canadian designer ten years hence expect to sell equally good designs, even if he were "only a Canadian?"

I send last year's prospectus; this year's is not yet ready. Wood-carving classes were added after the school started, and this year we hope to add others of somewhat similar industrial nature. You are the first to whom we could state this point about the school work, and it will be very helpful perhaps if your interest in the schools of Canada is sufficient to make you think it worth while giving our difficulty further consideration from your practical standpoint. For any hints or information, we shall be very grateful, as our aim is to arrive at something of real value in the conducting of an Art School, or else to give up trying if that be impossible, and to do something which is of real value. The material is here, bright, earnest boys and girls; the machinery is here, the school room and books and Nature. We are ready to set all in motion to bring out a good result—but is there a market for the product? That is our position.

Respectfully yours,
MARION LIVING

TORONTO, August, 1899.

DEAR MISS LIVING,—Your letter of yesterday to hand, with prospectus. The designs, I have no doubt, will arrive later.

Will you permit me to say "you are after my own heart" in your opinion of the Canadian Art Schools (?) and I fancy have much the same opinion as I have of the methods, so far shown, as to the proposed "Technical Schools."

Now, I wish to get to the core of the trouble about selling designs in Canada. Taken for granted that the schools were not capable, then is it possible to turn out capable designers? This kind of art training has been going on for years as manufacturers have been aware. As it was in past years with many Canadian manufacturers, so it is with designs. "Anything that will do, is good enough" no longer will suit the Canadian market. As Canadian manufactures are advanced to rank with the best, so is the demand for them increased, and so it will be in designs. At Grand Rapids, furniture designers are mostly Canadians, whose designs are detailed and made technically correct by other draughtsmen. This is made possible by the factories there being large and wealthy. The Canadian manufacturers could not buy the design because they could not afford to keep draughtsmen to do detail work.

Let a designer produce something of merit, and the world is his market. Such names as Cram, Whistler, Rattray and Morris do not require to look for a market, but when they do bring out something, it can be used, as it is correct in detail. Take the well known designer of Kidderminster, Mayer. It is not difficult for him to sell his designs, and even if they were sometimes short in drawing, still they are "Mayer's" and so command a price in any part of the world where designs are used.

You know also that there is always a certain vein in which the general taste of the time runs, and almost anything with any show of merit in the popular thing of the day, will be acceptable. A few years ago there was a mad craze for "Japanese," then to "Louis XIV"—now the tendency is to "Old English."

Now should a pupil worry out a design in, say a piece of furniture of either of the former styles to-day, it is very likely they would not be accepted by a dealer, even though they are, both in art and technique, correct.

Furthermore, designers must think out what line they are best able to work in, and make that line their principal one. The present century is one of condensed individual effort, so we find in every line of life, specialists. There are, for example, dyers who confine their abilities to dyeing nothing but black cotton yarn for hosiery, but that would not mean that they are not general dyers. The public are looking for the nearest thing to perfection they can get, and sloppy work is not only refused, but is bad for both the workman and the consumer.

To continue the theme, let us take it for granted (though I would be glad to have your criticism) that all I have so far said is correct, then how is a Canadian to become known so that his studies will bring him wealth and renown?

In all branches of manufactured commerce, there are journals devoting themselves to particular lines. Contributed designs and articles on styles are always gladly accepted, frequently paid for, and soon sought for when the contributor's fame is growing broad.

Years of experience have shown that Canadians entering any field, soon, by their ability, go to the top, and no reason presents itself to me that would make "industrial art" an exception.

Finally answering your question, should you undertake to teach designing for industrial art, and can designers expect to be able to gain a living by it in, say, ten years? My answer is, providing designs are technically correct, in line with the taste of the times, not exceeding regular charges.

It is my opinion that in ten years an extensive demand could be created for Canadian designs in all branches of industrial art.

Yours truly,

COLOR.*

By H. C. CORLETTE.

THERE are three questions with which we are confronted when we wish, as architects, to have color associated with the buildings we design. The first of these requires an answer which shall tell us how we shall satisfy this desire. The next asks us where may we legitimately introduce whatever we may decide to employ. But, perhaps, the most difficult of all is to decide upon the manner or method of treatment by which the decoration shall be done. This last consideration involves many things which each one must ultimately settle for himself. It asks what are the methods we shall follow, what media may be employed, how our decoration shall be introduced, the nature of drawing and design, and the qualities of color that should be adopted as likely to be the most valuable in producing the effects we wish to see. And these are some of the leading points only which a lover of color must consider if he would attempt to do good work. And in the work he may do it is to be hoped, for his own sake, and that of others, that he will never satisfy his own ideals though he may possibly perhaps sometimes please his critics. But let us begin by saying that his aim should never be to seek applause but to do his best, whatever that may lead him to, with the faculties he possesses and the opportunities which arise.

In asking ourselves how we shall introduce color in works of architecture we have, broadly, to consider and decide whether it shall be done by using colored materials as integral parts of the structure we wish to decorate, or by applying to the building such materials as will introduce the necessary color. The two methods combined are in fact necessary for a completely satisfactory result.

Of colored materials used structurally there are many old examples to be found, as is well known, in many parts of England. In Norfolk and Suffolk we may see how stone and flints have been used for this purpose, as in the parish church at Worstead, and the old Guildhall at King's Lynn. Essex gives us some instances where brick, stone and flint are associated in one building with very beautiful results. But in adopting the structural method we need be careful that we do not weaken the building by allowing our desire to introduce color to interfere with sound principles of construction. There may often be some temptation to do this by allowing the design of decoration to interfere with the proper bonding of walls, whether in stone, brick or flint, or any other combinations of several materials. Much decoration has been done, and beautifully too, with building materials, but not all of it is structural. But where we may seek for freshness in the methods of design is surely to be found in an endeavor to use some of the very many durable stones which have fine qualities of color. We have no doubt some time or other heard of a material called red brick. This has of course been used, but there seems no reason on grounds of expediency, or taste, why the white brick, so common in some counties, should not be adopted too. It is sound, strong and lasting, it possesses a good ring, and it has a modern virtue which none may despise, for it is cheap but not necessarily nasty if it is handled discreetly and with good taste. The yellow or dun-colored stock brick is also a good color. If it is used well, and, with some of those silver-grey bricks introduced into a wall of it, many excellent effects may be obtained. I say "if" such and such a material is used properly, because this small word implies the necessity of care in selection, care in the association of materials, and, above all, care in the design, the grouping together of the several elements that help to make architecture out of mere building. We need not limit our ideas by clinging to the no doubt safe custom of painting external woodwork in greens or some tone of white or cream. Tiles for roofing are too often red, but there is no reason why we should not resort to white ones sometimes, and we certainly should do well to decline to use so frequently the dead, textureless, purple-red ones, so much beloved by careful, but ignorant and untutored committees.

The subject of structural color is one to which we all as architects might especially devote more attention than it has been given in the past. For it is in this province that we depend upon our own resources. In the case of applied color we may call in others to assist us in realizing our ideals in the field of decoration. But in regard to decoration which is of the structure we stand very much alone, and there is little to hamper us in giving some rein to our fancy, except money. But it is, perhaps, really better that it should place some limit upon idealism, for without this we might be led to riot in extravagances, which would end in the destruction of all true principles of design. Byzantine and Italian art provide us with many examples of what was done during the centuries that are past, but we have some examples of a more recent date which should encourage us. Mr. Street has given us in the north and east fronts of the Law Courts, one of the most thoughtful and effective instances of this class of decoration that is to be found in London. In this, red brick and a grey-white stone have been used. And though terra-cotta is nearly always a hard and most unsympathetic material, yet, in conjunction with brick of a very beautiful red, it has been used with great success in the Exhibition Road front of the South Kensington Museum. N. Norman Shaw has shown us in the new Police Offices with what advantage to building, as architecture, grey granite, red brick, and white-grey stone may be used.

These instances indicate how some few of the ordinary materials may be made to serve us in our wish to introduce color in building. There are of course, others, but given the opportunity, much might be done by resorting to the use of glaced facing bricks in Lon-

* Paper read at the discussion section, London Architectural Association, March 10th, 1899.

don, where, in spite of their smooth surface, they would in time become toned down so as to be at least inoffensive.

We all know well that the Egyptians used color on everything to which they could apply it, whether on the exteriors or interiors of their buildings. But they were favored, like the other southern artists, by conditions of climate which allowed this freedom within certain limits.

They used color to cloth and express form, and to emphasize those features they thought called for such a treatment. And the methods they had introduced were those also which the Greeks developed at a later period. They colored the designs in relief or those which were cut back from the surface as incised work, leaving much of the native grey or red of the actual building material to play its part as a ground for the whole of the more brilliant decorations provided by the details.

We may, then, use color either structurally or by application to a material not possessing sufficient color of its own to satisfy our need.

Structural color seems the best method of providing what we require externally. For it is better able to resist a climatic opposition to its existence than applied methods, except those by which sound and durable colored materials are required as the medium of expression. We have, however, nothing to fear when we take up the question of internal decoration. For in this case we may adopt any method and any media we choose. And it is here we find the best opportunities for exercising our faculties or providing the necessary field for those who possess capacities which can satisfy our aspirations. The grounds or surfaces upon which we may begin our operations call for consideration under two heads. First, the material and texture of the ground and its own inherent qualities and capacities for producing, sustaining and showing color ; and then the color and method of treating the ground upon which any work is to be done. I am not prepared to discuss these points in detail. But it will not be presuming too far, perhaps, to merely recall to your minds some materials which ordinarily are the ground upon which we may ask colorists to provide us with design. The staple material in Egypt apparently was granite, but they also used brick, as did also the Assyrians and Babylonians, with diversely colored glazed surfaces.

Burnt clay, from the days of Sennacherib to the days in which we live, has always been found an excellent foundation for color, whether plain, or dealt with as were those tiles and bricks which were covered each with its piece of design, or formed a portion of one treatment, covering some large expanse of wall or floor. The ordinary red brick of the building was used with little or no preparation as the ground upon which to work in the case of a large painting in Albi Cathedral, in the south of Franch, near Toulouse. This work, executed during the first ten years of the 15th century, was done directly upon the brick surface of the great circular tower piers within the nave. It has stood all these centuries without decay, and the lines of the brick jointing, which are clearly visible, are a decided help to the texture and general effect of the whole scheme. Plaster, whether prepared for fresco methods or for tempera or oil, has also been proved a most valuable material. The Greeks had used it in some of the temples in their Sicilian colonies, in the form of what we call a fine stucco. It was upon this material as well as upon marble that they applied so carefully the brilliant colors they used. A thin coat of plaster over brick or stone was a favorite ground in the middle and later ages for both tempera and oil, as at St. Anastasia, Verona, Albi, and Chichester Cathedrals, and in some churches in Liege, to mention only some examples that I have studied. During the same period much color was applied directly upon stone with but a coat of paint as a foundation. Of this there are many instances in churches in various parts of England. Wood in every form has been painted at all times.

The other and second standpoint from which a ground is to be considered is that of the color it shall take as a foundation upon which decorative designs in color may be worked out. In deciding upon this we have an important point to consider, for it necessarily will affect the scale and tones of all other colors that may be associated with it. With the gold ground, so much favored by the Byzantine Mosiacists, we are familiar, but at Ravenna and in Sicily they had used a blue ground with the same medium. The Egyptians, the Greeks and the Mediævals had used white for the same purpose very largely. At Albi there is one of the finest decorated vaults I have seen, with a beautiful deep sky-blue ground uson which a great deal of white has been used in the conventional patterns which cover so much of it. The figure work is separated from conflict with the blue by being, as it were, panelled and painted upon a gold ground. The vault of the sanctuary at St. Alban's Abbey is a very faint blue grey with the patterns upon it treated in red and green and the larger emplems in gold. This last is also an instance of the value of heraldic color in a scheme of decoration. The vault itself showing us that we need not hesitate to work immediately upon the wooden planking which forms the filling between the ribs, even though the boards should open and show a line of junction. At the same time it may be remarked that the painters of this roof—or else some who tried to improve it—were hypocrites enough to try and mask the true material of which it is made by painting "stone" joints in white upon the ground. A practice which should always be censured without hesitation.

Those parts of the work which are at some distance from the eye of a spectator require to be very differently dealt with from those that are nearer to him. And in a situation such as this idea supposes the best results can be obtained by a good use of simple line and broad incomplex treatment. Firm, strong outline drawing is most valuable under these conditions, for it reduces the risk of confusion in design by requiring that each part shall be clearly brought out and simply expressed by methods that call for conventional, rather than any approach to realistic methods. The same principles that effect drawing in such cases also apply to design and color. And in regard to color it is essential that this also should be simple, conventional and flat ; that is, without modelling or shading. It need not be necessarily a dead color, without any variation of hue or tone, but it must be broad and quiet in feeling. And this result is best attained by limiting ourselves to the use of only a very restricted pallette, say with two, three or four colors. Of figure work I do not speak so much now as of simple decorative pattern designs. But to figure work the same principles for guidance may be applied, unless it is close to the floor ; in which case there are other methods that may be legitimately

used, more approaching what might, perhaps, be called those of a pictorial nature.

Generally the most fortunate results may be attained by selecting colors, those called the primaries, to play the most important part in the whole harmony, with the assistance of white and black. One primary with its complementary secondary, or two primaries and a uniting secondary helped with white or with black should be quite sufficient to produce very beautiful combinations. By advocating the use of primaries to a very large extent I am merely suggesting that we should adhere to a practice which the best work of the past has proved to be the most satisfactory.

To adopt the primaries as possessing the best qualities of color, need not mean that we should confine our use of them to those particular lines of the spectrum.

We are, on the contrary, free to use every shade and every line of all the primaries into which they may be converted by a mixture with black or white, or by the addition of another primary in such subjection of proportion as will not resolve the combination into a secondary color. In the same manner may we deal with the secondaries, provided we do not lose sight of the fact that our first aim must be to have color, not sombre shades of mingled ugliness. No one should be of so much force, in opposition to its companions, as to make it press forward out of the same plane in which the rest are held by due relation of tones ; nor should others be allowed unduly to hide themselves by receding from the association in which they should either play a dirtinct and necessary part, or else be omitted altogether.

Realism in very clever hands becomes almost deception, which we have to avoid as much as that conventionality, based upon ignorance and bad taste, which becomes distortion. But generally decorative work should interpret by a conventional use of the suggestions to be found in natural forms, while it is to pictorial design in color that we must leave the representation of these forms as they are.

The use of glass, stained or clear, as a method of adding color to architecture is such a common one that it is to be feared that many of us do not give it the careful consideration it deserves.

Where the light of day is very strong we can afford to dispense with some of it, and indulge in more color —color, too, of deeper hues and greater screening power. But where we want light there is no sensible canon of æsthetics that will permit us to discard what becomes a primary necessity ; and, above all, we can plead no excuse for the extravagance and unwisdom that would insert deep-toned glass in windows which, at the best, if entirely clear, would barely be sufficient to admit light enough to enable persons within a building to see its architectural proportions and its decorated grandeur of colored vaulting dome whose glittering gold shines unseen in the prevailing depths of gloom. Yet this is done with an object that is not self-evident, unless it be a love of mystery which, though it may show us vaguely the beautiful lines of imposing masses, may also blind the eyes which might otherwise look full with keen and interested intelligence.

It may be that my previous statements sufficiently imply what I feel should be the relation between an architect and those craftsmen who work with him. I say with advisedly, because they should not be expected to act merely for him. He has no right to consider any man who helps him to execute his purpose as a convenient tool. He must invite him to try and enter into the spirit of his own work, if it has any, and though such a man may be an interpreter he should be allowed also the privilege of exercising his mind as helping inventor. And since no body of men can possibly act together without the recognition of a guiding principle, there must be subordination of the many to the leading and oversight of one. But subjection is not, and never should be, interpreted to mean slavery. As in any constitution for larger purposes there must be rule from a centre if the action of law and government is to carry a purpose into effect, so it is in the things of art. A head of a State should not be too proud to seek the opinion and counsel of those who are qualified to be his advisers in special matters, and though it may be, and is, his duty to rule, it is also his privilege to confer with those he is bound to guide.

THE ARCHITECTS' EIGHTEEN CLUB.

The club established early in the present year by some of the younger architects of Toronto, has now been more fully organized under the above title, and has adopted the following as its Constitution :

1. This club shall be known as The Architects' Eighteen Club.
2. Its objects shall be as follows : The promotion of good fellowship amongst its members, mutual help in professional matters, and progress in architectural design.
3. The membership of this club shall at no time exceed eighteen, and shall be made up of architects whose names are subscribed hereto, who shall be known as "Charter Members," and such other architects as may prove eligible, and secure election with the unanimous assent of the then members of the club, attested by a vote by ballot from every member. And the proper election of candidates shall be vouched for by the president before admission to the club.
4. The officers of this club shall be as follows : President, first vice-president, second vice-president, third vice-president, and secretary-treasurer. All officers shall be elected by ballot, hold office for one year, and be eligible for re-election.
5. There shall be an annual meeting of this club for the election of officers, and amendments to this constitution may be made only at this annual meeting. A copy of any proposed amendment to this constitution, together with the name of proposer must be sent by the secretary to every member of this club at least two weeks before annual meeting, and no amendment to this constitution shall be declared carried unless the voters in the affirmative number two-thirds of the total membership of this club.

The following gentlemen have been elected to fill the offices for the ensuing year : Eden Smith, president ; J. C. B. Horwood, 1st vice-president ; Henry Sproatt, 2nd vice-president ; C. H. Acton Bond, 3rd vice-president ; Arthur E. Wells, sec.-treas. It will be seen that the social feature is the dominating characteristic of the club at present, and in order that this may be preserved it has been thought advisable to restrict the membership. The club is in affiliation with the recently organized Architectural League of America, and an effort will be made to secure for Toronto one of the series of architectural exhibitions which it is proposed to hold under the auspices of the League in the principal American cities.

PERSONAL.

Mr. Eustace G. Bird, of the firm of Smith & Bird, architects, Toronto and Barrie, is about to leave Canada for the Orient.

Mr. Geo. A. Mitchell, of Barrie, has been appointed Superintendent of Bridges and Buildings on the middle division of the G.T.R.

Mr. G. W. Gouinlock, architect, of Toronto, has just returned from a visit to Winnipeg, British Columbia, San Francisco and other cities.

A large number of relatives and friends assembled recently at the residence of ex-Ald. Wm. Carlyle, Toronto, to extend congratulations and good wishes to that gentleman and his estimable wife on the 50th anniversary of their wedding day. Mr. Carlyle is a well known pioneer builder of Toronto. He was also for twelve years a member of the City Council, and for six years Chairman of the Board of Works.

STUDENTS' DEPARTMENT.

ON SKETCHING.

"Only the best artists," said Hamerton, "can sketch really well. The vulgar notion about the facility of sketching is a delusion. A sketch differs from what is commonly considered finished work, in always acknowledging that there is much beyond what it has recorded, in avowing this quite frankly in the manner of the work." His felicitous description of etching as "highly concentrated drawing" may, I think, equally well apply to sketching, writes Mr. Walter Millard, in Architectural Association Notes. Confining ourselves, for the occasion, to the consideration of what we generally understand as architectural sketching, and not including exercises of the imagination, we may say that a sketch brings before us in a concentrated form the essentials of its subject as they impress themselves on the mind of the sketcher, non-essentials, and what seem to him points of secondary importance, being eliminated; and this it does as much by means of suggestion as by direct statement of fact. The art of happy suggestion is the handmaid of good sketching, determining alike how much is to be put in and what is to be left out. Spaces in a sketch left quite blank to our visual organs, may in the mind's eye be filled with detail if the suggestion of this be but rightly given; whilst, on the other hand, the covering of the entire surface with touches may fail utterly to convey any true idea of the subject, either as a whole or in detail, if the suggestion be not there of that "much beyond what is recorded," which Hamerton speaks of.

At the same time, though there is usually a great deal that may well be left out in making a sketch, and much that needs be omitted, no statement directly contrary to fact can be excused in the work on the mere plea that it is only a sketch. Architectural sketching, certainly, whether slight or finished, carries with it no privilege to tell or suggest the thing that is not; in it the whole truth may not be told—by a long way—nor need always be told, nevertheless, what is told or suggested must be nothing but the truth, if we are to say that the artist sketches well. His work may not go far but, so far as it does go, we expect it to be faithful.

The sketcher, who is also a student of architecture, makes his sketch of any object for the sake of something in it—that he wants. What this may be is for him to decide, in each instance, and the sketch will surely bear on its face evidence of what it is in his subject that he has cared for sufficiently to delineate it. To go and sketch what you do not care for or require for some definite purpose—to sketch just for the sake of producing sketches—is not the way to ever sketch well. More than that, the really vital question for students of architecture is, not so much how to sketch as, what you sketch and why you sketch it, a question which opens up a wider field of enquiry than is covered by the matter of Sketching only. On the student's choice of subjects to sketch may largely depend not alone the manner of his sketching but also, perhaps, the whole bent of his mind towards architecture, for life—not merely how he is to pursue the study of architecture but, ultimately, what sort of man he is to turn out as an architect.

A deputation from the Society of Architects lately waited on the Lord Chancellor and petitioned for a parliamentary committee to inquire into the present law with regard to ancient lights, with a view to saving the large amount of money being expended in determining the rights of owners in regard to the same.

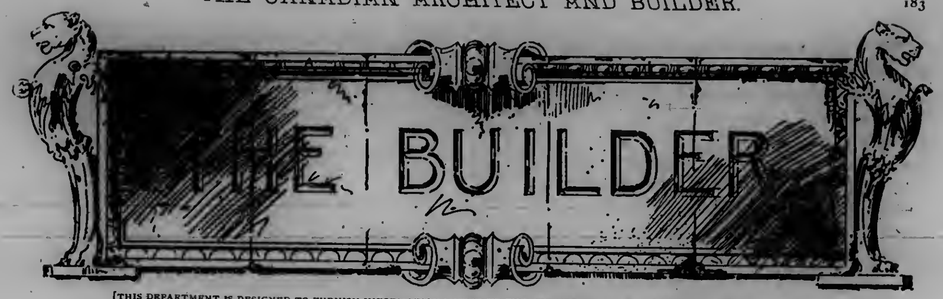
INTERSECTING ARCHES.

Intersecting arches were most likely an early, and certainly a very widely-spread mode of embellishing Norman buildings, and some of them were constructed in places and with stones requiring centres to turn them on, and the construction of these centres must have been by something equivalent to compasses. Thus, even supposing (which could hardly have been the case) that the arches were constructed without a previous delineation, the centres would have led to the construction of the pointed arch; and when once formed its superior lightness and applicability would be easily observed. To this remark it may be added that the arches necessarily arising in some parts from Norman groining would be pointed. A careful examination of a great number of Roman buildings will also lead to this conclusion, that the style was constantly assuming a lighter character, and that the gradation is so gentle into early English that it is difficult in some buildings to class them, so much have they of both styles. The same may be said of every advance, and this seems to be a convincing proof that the styles were the product of the gradual operation of a general improvement guided by the hand of genius, and not a foreign importation.—Builders' Reporter.

LIQUID AIR.

Prior to 1887, says the Engineer, air was thought to be a permanent or incondensable gas, but it was liquefied simultaneously by Messrs. Pictet and Caillete at that time, though at an enormous expense. About 200 years ago the lowest temperature thought to be obtainable was produced by a mixture of snow and ice, and was used by Fahrenheit in establishing a zero for his thermometric scale. Since that time scientists have reached a temperature some 400 degrees below the lowest point ever reached by Fahrenheit. Of the three known methods for producing cold, the first, i.e., by the rapid solution of a solid was used entirely up to 1820 and yielded a temperature of 50 degrees below zero centrigrade. The other two methods are the rapid evaporation of a volatile liquid and the rapid expansion of a cooled and compressed gas. By a combination of pressure and refrigeration, Faraday in 1823 liquefied all except six of the existing gases, but it was not until 1869 that it was discovered that these gases must first be cooled to a critical temperature. By subjecting hydrogen to an enormous pressure and at the same time lowering its temperature it was found possible to liquefy it. Hydrogen has a critical temperature only 33 degrees C. above the absolute zero of temperature. From the experiments performed, the conclusion was drawn that solids, liquids, and gases were but different forms of matter through which any substance could be made to pass by the addition or withdrawal of heat and pressure. The liquefaction of air economically and in large quantity has only recently been accomplished.

The dwelling of Sir Christopher Wren is now a national school in Botolph Lane, London. The house still contains a finely carved wooden staircase, but his private chapel has become a warehouse, with a window over the ceiling. Near by stands the church said to have been designed by his daughter, and which is peculiar in that the stone of which it is built remains white to some extent in spite of all the city smoke.



[THIS DEPARTMENT IS DESIGNED TO FURNISH INFORMATION SUITED TO THE REQUIREMENTS OF THE BUILDING TRADES. READERS ARE INVITED TO ASSIST IN MAKING IT AS HELPFUL AS POSSIBLE BY CONTRIBUTING OF THEIR EXPERIENCE, AND BY ASKING FOR PARTICULAR INFORMATION WHICH THEY MAY AT ANY TIME REQUIRE.]

Hints on Estimating.

There is no question connected with contracting for the erection of buildings, that appeals with such force to the mind of the contractor, as that of estimating; for on the correctness of the estimate, depends the measure of success. The contractor who can figure close, on the labor and the material required to complete any given work, has, not only a decided advantage over his competitors who figure in a hap-hazard way, but he also possesses the knowledge of knowing he holds the correct figures; and can pursue his work to completion, with a confidence born of such knowledge, and which is an important factor in faciliating the work and insuring a fair profit, where the careless or incorrect estimator would always be working under doubts, which would tend to considerably lessen the profits. There are some methods of estimating known to architects, builders and contractors for obtaining an approximate estimate of buildings by cubing the quantities; but such methods are of very little service to beginners, or to the man who desires a thorough and correct estimate, for, to arrive at an approximate cost of any given work, by cubing requires an intimate knowledge of the different classes of buildings and their values, and a readiness in making a proper allowance for costly materials and enrichments, qualities that few men possess in an eminent degree. Even for an off-hand "probable cost," the method of cubing is not to be recommended. It is always safer to take time and trouble in fully preparing an estimate, detailing in brief both work and material and by putting on paper each detail in some sort of order, then omission, will most likely be noted and adjusted before it is too late. It must always be borne in mind that it is not the mere walls, rough wood-work, plastering and roofing that make the great bulk of the cost of a building, unless one of a very plain description. It is the decorative part and interior finish and numerous small, but expensive items, that fill up the bill. One of the first things the estimator should do is to make a thorough study of the building, the elevations, plans, details, and location, and where plans and specifications are to be returned, it will be well to make a rough sketch, or sketches of them first, and to dot down in a small book the doubtful or not clearly understood portions of the latter, as these will be found serviceable when completing the estimate. All quantities should be carefully computed and written down under some system, and the prices current for material and labor in each particular added—the prices being for the finished work; for instance, the price of a door should mean the cost of a door with its frame, casings, mouldings, locks, hinges, fixing, hanging and painting. By adopting a method of this kind, the estimator will know that each item is complete, and it will be almost impossible to err in the final result. When all the items are written up, and everything is known to be entered, the totals should he made up and at least 10 per cent. added to cover profits and contingencies. In many cases, as much as 20 per cent is added to cover the last items mentioned, and this, is sometimes found not to be enough, particularly in buildings where hand labor is largely employed in carvings and decoration, as skilled labor of these kinds is an uncertain factor. On the rough sketches of plans made by the estimator, it will prove quite a help if the quantities of plastering, flooring, wainscoting, cornice, windows, doors, blinds, and other matters, are figured out in each room on the sketch as the estimating progresses; then, on a separate sheet of paper, when the estimate is complete, the items as shown in the plan may be put down and the totals summed up. This will be found an excellent way for new beginners.

How to Make a Chimney Draw.

Flues, into which two stove-pipes enter, frequently enter into fits of perverseness and refuse to draw, and in consequence there is much discomfort in the house. Sometimes this disagreeable state of affairs is caused because the draft through one of the openings is so much stronger than the draft from the other, that the smoke is prevented from working its way into the flue. This condition may often be remedied by adopting the scheme shown in Fig. 1. Let A be the lowest pipe in the flue, then if the fire is first lighted below, the current of air passing the upper pipe B, would ascend so rapidly, that it would cut off the draft entirely. To remedy this, run into the flue above, a stove-pipe cut the same as shown at B, with the long end facing the hole below. This will prevent the current of air or smoke from spoiling the draft, and will not close up the flue enough to interfere with the draft of A. The shape of the pipe at B can be determined by the size of the flue; if it is narrow or small, the pipe B can be trimmed to suit. If there should be any back-draft at A a slight projection of the pipe at its top will do a great deal towards preventing smoke from entering the house. Where a fire-place is attached, the problem of good draft becomes more difficult, but, in many cases the back-draft is caused by having the throat too small, too large, or else built at the wrong angle. Where the fire-place opening is very

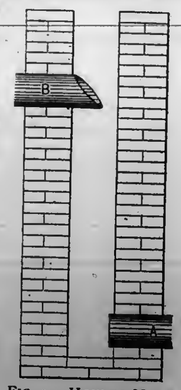


Fig. 1.—How to Make a Chimney Draw.

large, and it is found that the chimney smokes, it may be sometimes cured by having a hood put over the opening, dropping down anywhere between five and ten inches, and projecting four or more inches from the breast of the fire-place. If a fire-place smokes when the wind is only from one direction, and draws well otherwise, one of two things is the trouble, either the chimney is not high enough, or some tree or some other building is the cause of the down draft. In a high chimney it may be necessary when starting a fire, to drive out the long columns of cold air, by burning loose paper or by setting fire to a rag that has been saturated with coal oil, which will force the body of heavy cold air up the flue and thus permit the passage of the lighter warm air from the fire, and when once the warm air takes possession of the flue, the draft will generally be all that is desired.

Defects in Some Eaves.

It was a common practice some twenty-five years ago, to finish off the edge of the roofs of cottages with a slight curve upwards in the manner shown in Fig. 2, and it must be confessed, this curving of the ends of rafters and hips gave to the roof quite a graceful appearance, but, if the projection of the eave happened to be a foot or more over the wall, this curving became a very serious matter , as the sudden retarding of the flow of water from the upper portion of the roof, would most assuredly, in freezing weather, increase the tendency for ice to accumulate on the edge of the roof, a condition that would cause the water to "back up" under the shingles or slating causing leakages on the wall, or on to the ceilings of the buildings. In warm countries, the adoption of the method of curving the roof at the eaves, may do very well but in this "Canada of ours"

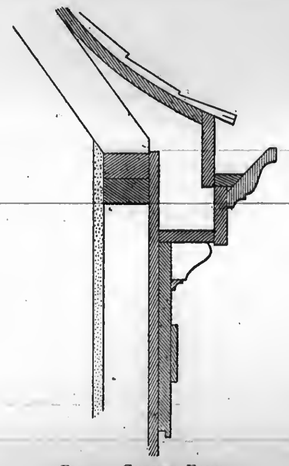


FIG. 2.—CURVED EAVE.

the system is bad, and should not be practised. The method of forming an eave, shown at Fig. 3, while not so graceful, is sure to give better satisfaction in the end. The curving feature might be used with success perhaps, in mansard roofs, or on roofs having but little inclination from the perpendicular, but for the ordinary pitches, such as are generally employed in this country, the curving as shown in Fig. 2 were better avoided. Many of the old roofs that were so curved years ago, have either rotted out at the eaves long since, or have had the curving removed when re-shingling, for few of the older cottages so treated when first built, are to be found now showing this style of finish. Recently, there seems to be a desire among country carpenters, to revive the custom—likely because of its graceful effect—but, if we were asked our advice on the matter,

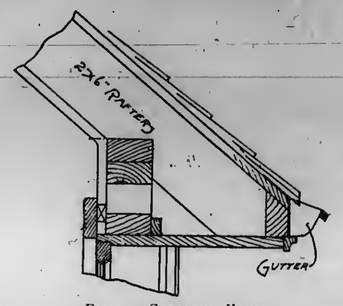


FIG. 3.—STRAIGHT EAVE.

we should be strongly inclined to give it up in the same manner, and with the same emphasis, that Punch replied to a correspondent who was about to get married —namely, "Don't."

Form for Estimating.

The following makes a good form for making up an estimate ; the columns may be ruled off as given, on ordinary foolscap paper. The estimator will find great assistance by making use of a little work entitled THE CONTRACTORS HAND-BOOK, as it contains many things he will find useful, in the way of quick methods of determining quantities of brick, stone, flooring, roofing, plastering, and many other things ; and if handy on the desk or table it may be referred to at a moment's notice.

FORM FOR ESTIMATING.

QUANTITY	DESCRIPTION OF WORK	PRICE, $ cts.
500	yards cubic, excavating for cellar, walls, &c.....	
65	cords rubble masonry, and all materials.....	
90	thousand bricks laid in wall, at.....	
18	squares 1½ inch flooring, laid, at.....	
24	doors, 3 x 7 ft., 1¾ inches thick, including frames, mouldings and hardware, at.....	
28	windows, frames, sashes, locks, weights, pulleys and all complete, at	
28	pairs inside blinds, in two flaps, hung and finished, at.	
3	double windows, complete, at.....	
11	summer blinds, complete and fitted, at	
90	yards of stucco cornice, at.....	
1206	yards of plastering, including lathing and all materials, at.....	
4	centre pieces, at.....	
2	stucco brackets in hall, at.....	
2	flights of stairs, including rails, newels, balusters, &c.	
28	squares of shingling, including roofing boards, nails, etc., at.....	

The foregoing description will be a guide for all other items. After making use of these forms they should be carefully laid aside for future reference. While there is no royal road to estimating, the labor may be very materially minimized if well directed methods be adopted.

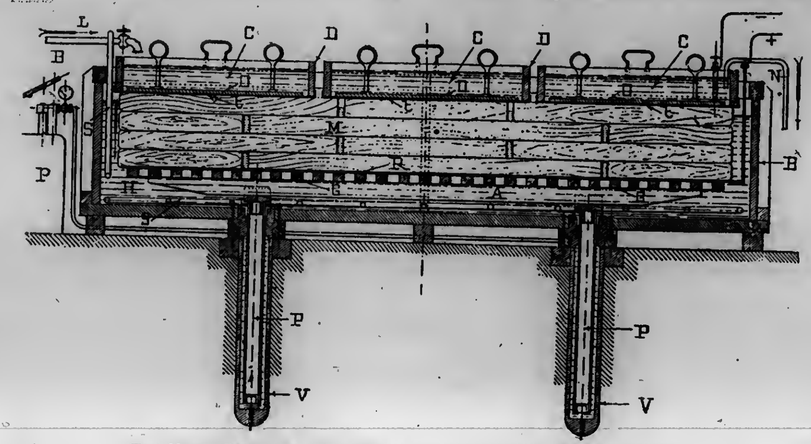
The Trent Valley Peat Fuel Co., of Peterboro', Ont., has placed an order with the F. D. Cummer & Son Co., of Cleveland, Ohio, for one of the world-renowned Cummer dryers. The dryer will be used for drying peat preparatory for pressing into briquettes. The dryer will have capacity for evaporating two and a half tons of water hourly from the wet peat, which would give about sixty tons of dried peat per day of 24 hours.

MANUFACTURES AND MATERIALS

SEASONING OF TIMBER BY ELECTRICITY.

A METHOD of seasoning timber by electricity, patented by Messrs. A. L. C. Nodon and C. A. Bretonneau, of Paris, France, has been adopted quite largely in Europe. The patentees have recently made some further improvements in their apparatus, which are shown by the accompanying illustration.

The apparatus used remain essentially the same, the modifications being improvements of detail, including the employment of a stronger current of electricity, and in modifications of the apparatus to make it more efficient, lighter and easier to handle. The improved bath is composed of a solution of 10 per cent. of neutral borate of soda and 5 per cent. of resinate of soda maintained at a temperature of about 35 degs. C. during the process. The electric current which causes the electro-capillary changes, and causes the sap of the wood to be extracted by the borate, has an electromotive force of 50 volts, sufficient to traverse 50 to 60 centimetres of wood



THE NODON-BRETONNEAU PROCESS OF SEASONING TIMBER BY ELECTRICITY.

and complete the operation in five hours. The solution of borate and resinate of soda penetrates by reason of the electro-capillary action, into the whole mass of wood, and produces a thorough extraction of the sap, which is carried towards the anode and remains mixed in the bath. To facilitate the manipulation of the woods, and to obtain a controllable immersion, according to the progress of the treatment, the patentees have devised the arrangement represented in the illustration, in which H indicates the bath, S the heating coil, L the water supply pipe, O the negative pole (cathode). The frame of double lower bottom rests on the support, A, upheld by the pistons, P, of an hydraulic jack, V. This latter is manipulated by a pump, p, and the pistons, P, can either be raised or lowered as desired. When the latter is raised, the wood can be placed on the frame, and then be plunged in the vat, B, by lowering the pistons. The same action reversed serves to withdraw the wood after treatment. The upper porous partition C has also undergone a modification in its construction to make it lighter and less expensive ; it is now composed of a number of sashes or frames, D, the bottom of which is formed of strong sail-cloth, t, fixed with brass nails. These frames are lighter and more convenient to handle, and are conductively connected together.

THE MARKET FOR CEMENT IN AUSTRALIA.

MR. J. S. Larke, Canadian commercial agent at Sydney, N.S.W., writes that there is a market in that colony for nearly 200,000 barrels of Portland cement per annum, and a proportionate demand in the other colonies. There is a revival in building operations. It is understood to be the purpose of the proprietors of the British Columbia Portland Cement Works at Vancouver to seek an outlet in Australia for their material, and the extent of the demand, as indicated by Mr. Larke, would show that an extensive trade is likely to be the result.

GLASS MADE BY ELECTRICITY.

AT an experimental plant at Cologne the electric furnace has recently been employed in making glass, and the process is said to work most satisfactorily. The apparatus is much similar to the ordinary form of furnace, and the glass obtained is free from impurities. The chief saving effected is in the retention of the heat, which in the usual type of furnace is transmitted to the ground. The heat is supplied by the electric arc, and the charge can be raised to the melting temperature in fifteen minutes, instead of thirty hours, as is the case with the ordinary furnace. A large furnace also is not required, and the work can be stopped at any time, such as holidays and Sundays, without any loss of energy. A saving in coal consumption of as much as three-fifths is claimed for the process, and for experimental work it allows small quantities of the material to be used.

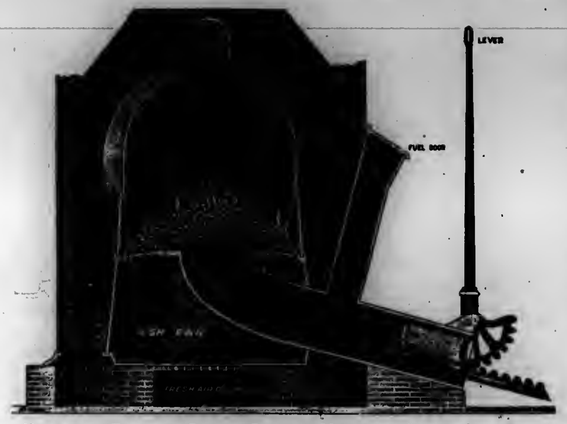
THE PRICE OF PORTLAND CEMENT.

IN sympathy with the general advance in prices of materials in other lines, and in face of a strong demand, the European manufacturers of Portland cement have recently increased the price, and the American manufacturers are being urged to do likewise. The cost of production is declared to have been enhanced of late from 8 to 12 cents per barrel.

The Dominion Bridge Co., Montreal, whose works are at Lachine Lock, Quebec, near that city, are making important additions to their plant which will enable them to increase their output of iron and steel products to the extent of about 8,000 tons per year.

THE UNDERFEED FURNACE.

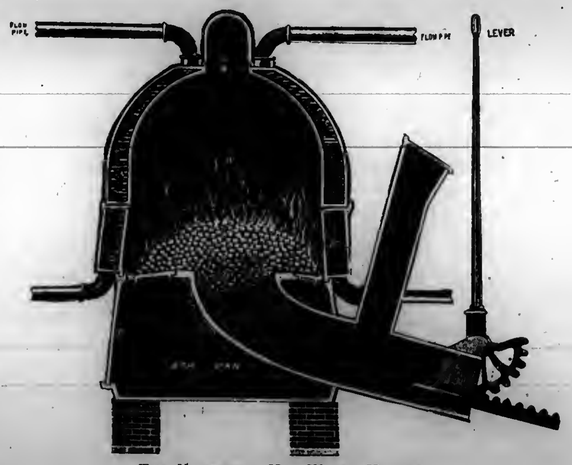
THE accompanying illustrations show the method of construction and operation of an underfeed furnace for use in heating public and domestic buildings. This device is the invention of Prof. Colton, of Hiram, Ohio, to whom patents were granted in 1893. The furnace is manufactured in Canada by the General Engineering Company, Canada Life Building, Toronto. In the practical application of the underfeed, many questions suggested themselves. Would the fire burn into the coal from the top? Could the coal be introduced from below without interfering with the grate and ash pit? Could the means of introducing the fuel be so simple as not to greatly increase the cost of construction? The underfeed system can be applied to hot air, combination, hot water, or steam heating furnaces. It is claimed that, after much labor and many costly experiments, those questions have all been answered in the affirmative, and the device has been perfected whereby the coal is pushed into the fire pot under the burning coal without interfering with the grates or ash pit, or involving extra labor. It is claimed that with this system all gases liberated from the fresh fuel, on passing through the fire above, are ignited and consumed, thereby rendering it an impossibility for same to permeate the air, regardless of the position of the dampers.



UNDERFEED FURNACE—SECTION SHOWING METHOD OF INTRODUCING FUEL.

In applying the underfeed to existing hot water furnaces, all that is necessary is to raise the fire pot section, together with the sections above, high enough so that the ash pit section may be removed. If there is enough "spring" in the pipes this can be done in a very short time.

The purpose of this method of firing is to bring the hottest part of the fire uppermost next to the heating surfaces where it is required, and to utilize in a useful way all the heat in the coal—also to prevent the admittance of cold air to the furnace during firing or at any other time.



THE UNDERFEED HOT WATER HEATER.

In the matter of cleaning stone and brickwork, a writer in one of the English journals suggests using a scrubbing brush and a solution of water mixed with 8 ounces of spirits of salts to 1 gallon. He states that this will bring out the work as bright as new.

IRON CONSTRUCTION.

THE following remarks were expressed in the course of a discussion at the Franklin Institute, Washington, on the structural design of buildings, by Mr. William Copeland Furber:

On the question of rust protection I may be taking advanced ground when I say I believe that entirely too little attention has been paid to this matter by designers, yet the liability of corrosion is so great, through exposure and improper covering and the lack of preparation of the metal to receive and hold the covering, that I think the use of the sand-blast or some equally efficient means to remove the mill scale and permit the direct application of the protective covering to the actual surface of the metal is not only justifiable but imperative. When the skeleton is once enclosed, examination is difficult and repair practically impossible, and as the life of the building is coincident with the life of the framework, and the value of the investment is determined primarily by the integrity of the finished structure, a short-sighted and temporarily apparent economy should not be allowed to curtail a proper expenditure on the skeleton, which, if intelligently made, will assure the building a practically indefinite existence.

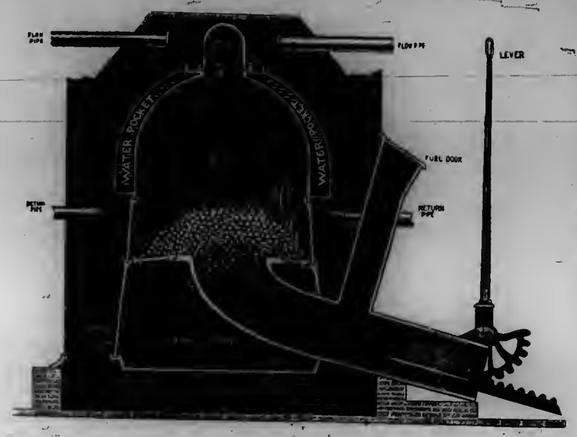
As to the best means of providing against rust, the information already at our disposal seems to me sufficient to indicate a safe course to pursue. Ledebur, in an "Essay on Oxidation of Iron and its Admixtures, Rusting, and the Influence of Liquids upon Iron," points out that three factors are required to produce rust—that is, the hydrated oxide, viz., water, pure oxygen and an acid. Portland cement, by furnishing a base for the absorption of any acid likely to be found, will eliminate one of these factors and will thereby prevent rust. So that, with the other valuable qualities it possesses, it forms a protective covering of great value. But while this is true if the cement is in direct contact with the metal, we know that as the shapes come from the shops they are covered with mill scale, and that any covering applied to them adheres to the scale, and that a mechanical separation of the scale is easily possible.

Should water penetrate the cement or other covering,

through cracks, and find its way between the scale and the actual surface of the metal, the scale being electro-negative to the body of the metal, the elements of a battery exist, and the degree of corrosion is a matter of time. We also know that as concrete is frequently put in place the voids are not filled up, and spaces are left for the accumulation of water, which may be present, forming, with the scale already there, rust-producing factors.

It is not an uncommon thing, where iron footings are placed below the water level, to find that the water has dissolved and washed out all the cement which the concrete originally contained. I have seen more than one building standing with its feet wet, the cement having been washed out before the concrete set, leaving but the stone and sand remaining.

I believe, and have followed it out in my own practice, in placing all iron above the line of saturation if at all possible, and in the Harrison building, which has been referred to here to-night, and for which I was the designing engineer, the grillage of I-beams in the footings is above the water level, the foundations below this being entirely of concrete; but when for any reason the grillage or underground metal work has to be placed below the water level, most extraordinary care should be used to see that the metal work is free from scale and unpainted, that the trenches or pits are so lined that no part of the excavation comes in contact with the beams, that the concrete contains a large proportion of cement, with the aggregate or filler in small particles, so as to allow being rammed easily into a dense mass without voids. In the placing of long girders underground it is not an uncommon thing to see the earth fall in around the girders, and to see the concrete filled in without the earth being removed. It is needless, perhaps, to say that whenever this occurs a fault is formed in the concrete, and rust must inevitably follow.



THE UNDERFEED HOT WATER COMBINATION HEATER.

On the structural work above ground the danger of corrosion is not so great, but is sufficient, I think, to warrant the use of a concrete envelope around the columns and external girders, for the masonry covering is not always thick enough or tight enough to exclude moisture. If concrete is used the metal work should be temporarily protected by a coat of oil, which will be worn away by the time the building is ready for closing in.

THE UNDERFEED FOR EXISTING FURNACES.

THE UNDERFEED FOR STEAM HEATING.

TESTING DOORS.

A TEST of the comparative merits of an iron door and of a wooden door sheathed with tin-plate, in stopping the spread of fire through an opening, was recently made by the British Fire Prevention Committee. Both doors were obtained on the open market, but whilst the iron door was hung in a rebated frame, the sheathed door, as fixed by its maker, was hung to fit closely to the face of the wall, with a 3-inch overlap around the opening. The doors were exposed for one hour to a fierce fire, the temperature attained being 2,000° Fah., which was followed by the application for five minutes of a stream of water. Both doors remained in position, but were buckled and warped. The first spurt of flame passed the sheathed door five minutes after experiment commenced, whilst with the iron door the flame was kept back four times as long.

THE LONDON BUILDERS' EXCHANGE.

ON August 17th a large number of the members and friends of the Cleveland Builders' Exchange visited London, and were entertained and shown the places of interest in the city by the officers and members of the London Exchange. Luncheon was served at the Tecumseth House. The members of the London Exchange afterwards accompanied the visitors to Port Stanley, where they in turn were royally entertained by the Cleveland builders.

THE AMERICAN SUPERINTENDENT.*

THE art of superintending is not only the art of fault finding, but the art of fault remedying and fault preventing. If building operations were not attended by mistakes, misinterpretations and disagreements, it is evident there would be no need for the genus superintendent; hence it is with the difficulties that beset him, and their remedies, that this article will chiefly concern itself.

The faulty plan is the first source of annoyance. Frequently a set of drawings is so hastily finished that omissions and inaccuracies are almost unavoidable. Contradictions and discrepancies occur between the general drawing, scale and full-size details, and the specifications, resulting not only in annoyance and controversy, but also in no little expense and delay if not discovered before the ordering of material, or the performance of that part of the work affected by them. It should be the superintendent's first care to make a thorough examination of all plans and details, comparing them with the specifications and with each other, in order that all errors may be discovered and eliminated before the work is begun. This examination will also aid in fixing in the mind the peculiarities which differentiate the new work from others with which he has previously been connected.

The plans furnished the contractors should be complete. The drawings should be provided in sufficient number to thoroughly cover the work, and show plainly how it is to be done, so nothing will be left to the imagination of the builder. There should be numerous sectional drawings, which shall clearly show any unusual or special features or finish, and a sufficiency of dimensions to permit the execution of the work with the fewest possible arithmetical calculations by the workmen at the building.

Draughtsmen are usually reluctant to bind themselves by figures on a drawing, but unless the workmen are mind readers—and few of them are—it is hardly to be expected they will properly carry out the artist's idea when he himself declines to define it. In figuring dimensions, it is of advantage to give, where possible, a string of distances between centres of main features, with subordinate lines of dimension for the separate parts of those features, and also to note on each plan the bays or dormers which are to centre with some other feature of the building above or below them. This method will materially decrease the liability of the builder to make mistakes in laying out his work, and an error, when made, may be quickly found and easily rectified without affecting more than a single feature. It will also be found useful to adopt a "building" line (usually the line of the first storey above the water table) as a base line from which to figure dimensions, as well on the basement and foundation-plans as on the first floor plan. This building line may be shown by a red or black dotted line on the drawings.

The value of explanatory notes on drawings should not be underestimated, and the more of them there are even though they are repetitions of items covered by the specifications, the better. The plans may be called common property, since they are used by all the craftsmen alike, while the specifications, if accessible, are usually so divided that each foreman refers only to the particular section covering his special work, and is ignorant of its relation to that of other trades. In such cases it is evident that proper co-operation is improbable, if not impossible.

The repetition of the common lines of height on all elevations and vertical sections is to be recommended. It is quite a convenience to the superintendent, and saves mistakes arising from the builder's inclination to trust to memory rather than to turn to the plan on which the heights occur. It may be said that the contractor should be made to suffer for his own negligence, but it must be remembered that the drawings are really implements or tools as necessary for the prosecution of the work as the trowel, saw or hammer, and it is the duty of the architect to furnish them to the builder in as perfect a state as possible, if the final results are to be satisfactory.

Any improvements tending to convenience in handling will amply repay any extra time consumed in preparing them in the draughting-room, and a day or two, or in unusual cases even a week, devoted to figuring and checking up dimensions on the working plans will avoid expensive misakes, and time-wasting delays, with the resulting disputes and controversies, and at the same time will give the plans a definiteness that will enable the estimator to make a closer proposal for the work before the contract is awarded. For the same reason it is desirable to fully indicate by framing plans or diagrams the kind and size of materials to be used and the methods to be employed.

It is a decided advantage to the superintendent if he has been employed in the production of the plans whose execution he is to supervise. His familiarity with the drawings will enable him to see more readily the effect that a change at one point will have on others of the work, and will be especially valuable to him when it is necessary to give an order without a chance for study or leisurely consideration.

The superintendent should secure a complete set of all drawings to be used in the work, including general plan, scale and full-size details and diagrams outside of the sets furnished the contractors. He should also have his own copy of the specifications, and all agreements and contracts to which to refer in case of dispute between contractors concerning the scope of their respective contracts. The above applies only to the superintendent in charge of large work not in the same city with the architect, who cannot therefore have access to the office sets.

The first duty of the superintendent on the ground is to check up the dimensions and laying out of the building. For this a steel tape should preferably be used, and for a long series of measurements the ring end held at a single point while the different required dimensions are marked off in order along the length of the tape from a memorandum slip previously prepared. This prevents accumulative errors, which with the average mason reaches 4 or 5 inches in 100 feet before it is considered worth noticing. In order to keep the work in hand the superintendent should require that he shall have approved all work laid out before building is proceeded with. To measure the width of footing trenches a stick cut to the width of the footing, with a notch for the building line, will be found convenient. A plumb line dropped from the building line stretched above will pass the notch, and show at once if the trench is properly located and of the required size. With several different widths of footings, and for places where no line can be stretched in the excavation itself, this method should save much time and many mistakes.

If the plans show no chases or slots for soil and waste pipes, or gas, water and electric mains, the superintendent should arrange with the mason to build them in the proper places as the walls go up. Neglect to consider this frequently leads to unsightly results, such as a group of pipes cutting through a handsome cornice, or spoiling the appearance of an otherwise attractive room. The location of the horizontal pipes should also be considered, whether in the floor, that is, between the joists or cut in over them; under the floor, hung to the ceiling below and exposed to sight; or under a raised floor; also, whether the marble or other wainscoting back of toilet-room fixtures can set flat against the wall or must be moved far enough forward to allow the waste, supply and vent pipes to run behind it.

The note book should be the superintendent's constant companion, not only for jotting down ordinary items to jog the memory for the daily details of the work, but to be used as well to preserve a record of orders to and agreements with contractors, instruction to foremen and alterations or changes sanctioned in plans or specifications. In fact, the entries should include everything relating to the building which may possibly be needed for future reference. Especially should dates of orders, and delivery of plans and details (if no record is kept in the office) be noted down, in case it becomes necessary to refer to them in settlement of claims for enforced delay in completing a time contract.

The superintendent should notice from time to time if all the workmen who can be advantageously employed are on the different branches of the work. He should enquire concerning the ordering of material and the progress of the work of the sub-contractors, in order that no delay be caused by their failure to come to time. More time is thus lost than from all other causes together.

The superintendent should see that application is made for detail drawings in such season that they will be on hand before needed for use.

It is a good plan to occasionally visit the mills, foundry, pattern and modelling shops, to inspect the work in progress, and explain to the workmen points that are vague or misunderstood before it is too late.

One should not be above accepting advice from contractor or workmen for fear of loss of prestige, since frequently their experience suggests methods or facts, either of merit in themselves or expedient under existing circumstances. Neither should one be so complaisant as to adopt these suggestions without careful consideration. If they are rejected it should be done so as to leave no doubt about it in the mind of the workman, nor as to method actually to be employed. Frequently it is necessary to say to the builder, "Your way may be as good, but the specifications prescribe a method which I know will give results satisfactory to the architect, and as I am answerable to him after your responsibility in connection with the work ceases, I must require you to follow the specified directions." Material or work condemned should be ordered removed at once. It is a common trick among foremen to agree to see to that later, with the expectation that the matter will slip the superintendent's mind until the defective material or work can be hidden or covered up.

Structural iron is usually required to have several coats of paint after delivery. In order to insure its receiving the required number of coats and proper care in their application, and also to prevent a delay for painting and drying when the material is wanted for use, it is well to insist that this work be done as soon as the metal is on the ground.

The superintendent himself should cultivate the following characteristics: Tact, force, decision and gentlemanliness. He will be called upon to listen to endless complaints of interference by one contractor's men with the work of the others, and is expected to arbitrate them. He will be referred to as a walking specification by foremen who find it more convenient to question him than to take the trouble to look up requirements themselves. This he should be encouraged to do. Some foremen ignore the specifications entirely, depending on the superintendent to assume responsibility for anything opposed to them which he has failed to discover, but "which it is his duty to find out," as Mr. Clarke was once informed by a foreman. The same brilliant fellow was one day very much put out with him, because his attention had not been called to a note in one of the plans. He had shored up a 17-inch brick wall, and cut an opening in it in the first storey, before he discovered that it should have been torn out above also, to make way for a stud partition to take its place. Of course, the single I-beam which the note called for, while ample to support a stud partition, would hardly do the same service for a 17-inch brick wall. Another nuisance is the man who always knows a better way to do everything than the way he is called on to do it (simply for the sake of change), and who is positively unhappy if his suggestions are unheeded. Of course, the superintendent ought never to lose his temper. He may lose his patience and express his opinions, but he should let the other fellow put himself at a disadvantage by getting mad. As a general rule, however, flattery builds quicker than friction, and the greater the superintendent's skill in overcoming difficulties, expediting work and settling differences, the better superintendent he is.

* From an article by Mr. Edwin B. Clarke published in the Technograph, the annual published at the University of Illinois.

LEGAL.

The Public School Board of Toronto has appealed to have set aside the decision of Judge McDougall, under which the Board were fined for alleged violation of the city plumbing by-law in permitting the use of a dry earth closet system in the Church street school. The rule was asked for on the grounds that there is no appeal from the dismissal of an information, that the proceeding should have been by indictment, that by-law 2478 should not apply to defendants as to the form of a system installed before it was passed and approved by the Medical Health Officer of the City of Toronto, and on other grounds. Rule nisi granted.

ROSEDALE PRESSED BRICK & TERRA COTTA CO. v. FOSTER.—Aylesworth, Q. C., for the liquidator of the company, appealed from order of Master in Ordinary dismissing application by liquidator to settle the name of Major Edward H. Foster upon the list of contributories of the company in respect of ten shares. The alleged contributory signed the stock book before the incorporation of the company, and the shares were allotted to him after the incoporation. There was, however, no proof of formal notice of allotment, though there was a correspondence between the alleged contributory and the secretary of the company in which the latter insisted that the former was a shareholder. The Master held (following Tilsonburg Mfg. Co. v. Goodrich, 8 O. R. 565) that subscription before incorporation was of no avail unless there was a subsequent ratification, and there was none such here, and the alleged contributory was not a shareholder by estoppel. The appellant contended that the subscription was a continuing offer to take shares, and when it was accepted after incorporation it became a contract. The court was unable to distinguish this case from the Tilsonburg case, and also pointed out that the alleged contributory had a valid excuse for taking advantage of the absence of a binding contract to take the shares. Appeal dismissed with costs. Leave to appeal granted.

USEFUL HINTS.

TO CLEAN SOILED WALL PAPER.—First thoroughly dust off the walls and ceilings wherever the paper to be cleaned may be. Tie up two quarts of wheat bran in a coarse flannel cloth or bag made of flannel and rub it over the paper briskly, taking care to miss none of the space.

A quick-drying, weather-resisting paint of dark colour for zinc sheets is made by mixing 6 lbs. of graphite (plumbago) with 1 gallon of vinegar. The oxidized surface of the zinc, previously well brushed, is painted with the above, one coat giving a sufficiently dark colour. New sheet zinc, however, requires two coats, and must first be oxidized by the following application, which is not strong enough to cause any deterioration of the metal: One part each of chloride of copper, nitrate of copper, and sal ammoniac, dissolved in 64 parts of water, and 1 part of hydrochloric acid added to the solution.

IRON SCREWS IN STONE WALLS.—An ingenious and simple method of fixing metal screws into stone walls has been devised. Wooden dowels, beside the tendency to weaken the walls, do not afford security and permanence. A wire of suitable thickness is coiled on the screws so as to follow the threads of the same, and form a kind of screw nut. The coiling may commence near the head of the bolts and proceed towards the point by laying the wire into the grooves. After arriving at the point of the screw the wire may be wound backward over the helix already wound on, but with a steeper pitch, so as to leave wider interstices between consecutive convolutions of the wire. This wire coil or nut is introduced into the hole formed in the wall for this purpose, being slightly wider in diameter than the outer layers of wire, after which the surrounding spaces are filled up with plaster of paris, cement, or similar binding material in a plastic condition.

A NEW PAINT REMOVER.—The most popular mediums for removing oil paint coating are almost all mixed with caustic alkalis, and consequently, if the article to be cleaned is of wood or similar material, have a destructive action on its organic composition. Such mediums can, therefore, only be employed sparingly and with great care. Moreover, they do not only decompose the wood fibre, but also prove dangerous to the skin of the operator, owing to their caustic quality. But if a mineral oil is employed in the solution of the caustic alkalis, it will be found that all the drawbacks named will disappear, while at the same time the dissolving qualities of the medium are considerably increased. In order to keep the mineral oil continuously in emulsion, the resulting mass is mixed with a correspoding quantity of an indifferent body, such as powdered pumice stone, sawdust, etc., until a paste is obtained, which constitutes a powerful and lastingly effective paint dissolvent. Same can be applied with great ease on any surface, and has no injurious action, neither on the fibres of the wood nor on the skin of the workman. The following mixture is given by a foreign exchange as a recipe: Dissolve 20 kilos of caustic soda of very great concentration in 100 liters of water; mix the solution with 20 kilos of mineral oil and emulge in a kettle with a stirring contrivance. Add 20 kilos of sawdust, with further stirring, and run the product obtained through a paint mill until the paste is ready.

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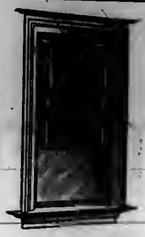

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THE PROPERTIES OF DOUGLAS FIR.

It is learned from the Engineering Record that the properties of Douglas fir have recently been studied by Mr. Edward Mohun, M. Am. Soc. C. E., who has compiled the results of a number of earlier studies and deduced constants for use in the various formulas for beams and pillars of this material. For timber of the best quality, such as would be accepted by an inspector for bridge or trestle work, he adopts an ultimate tensile stress of 14,000 pounds with a factor of safety of ten for obtaining the safe working stress, 5,000 pounds for the ultimate crushing strength endwise with a factor of five, 500 pounds for the ultimate crushing stress sidewise with a factor of three, 6,000 pounds for the ultimate skin stress with a factor of three, 1,400,000 for the modulas of elasticity, 400 pounds for the ultimate shearing stress wilh the grain, wlth the factor of four, and 40 pounds as the weight per foot. The ordinary life of a structure of such material designed with the factors of safety mentioned is believed to be about twelve years. Mr. Mohun has prepared some valuable tables, giving not only various formulas based on these constants, but also the safe loads of Douglas fir beams and a comparison of the results which have been obtained by different investigators of the properties of this important material.

HARDENING PLATSER OF PARIS.

A German patent has been granted for the treatment of articles of plaster of paris with an aqueous solution of ammonium borate, for the purpose of hardening them and rendering them insoluble in water. A simple and efficient process for accomplishing this object would be highly desirable, as it would serve to greatly prolong the life of plaster paris casts, which, being quite soft and not entirely soluble, sooner or later become superficially defaced, and washing specially wears down the outlines of the object. The process above referred to is said to give results decidedly superior to anything that has heretofore been proposed. The hardening liquid may be either mingled with the plaster in the act of moulding, or may be applied on the surface of the finished casts with a brush. The solution is prepared by dissolving boracic acid in warm water and adding thereto sufficient ammonia to form the borate which remains in the solution. The manner of using the solution is thus described: The saturation of the gypsum or painting of the plaster of paris is carried out in the cold. The objects are subsequently rinsed off and dried. The surface becomes very hard after two days and insoluble in water, while the induration in the interior advances more slowly. By means of the fluid described, gypsum floors can be hardened and rendered more durable and impervious to the influence of the weather. Saturating with ammonium borate is said to be especially useful on exterior walls of buildings, barracks, &c; on the latter, because experiments have proved an antiseptic action of the liquid.

Messrs. Baker & Co., 38 Cathcart street, Montreal, have lately issued an attractive catalogue in which are illustrated the many styles of architectural and decorative relief ornaments which they manufacture as well as ratchet joint plaster board and patent plaster partition blocks.

The Luxfer Prism Co., Toronto, has been reorganized with increased capital, the officers being as follows: President, Mr. Thos. W. Horn; vice-president, Mr. E. B. Osler, and secretary-treasurer, Mr. F. W. Barrett. Work is already well forward in the erection of a new and extensive factory in rear of Nos. 98 and 100 King street west.

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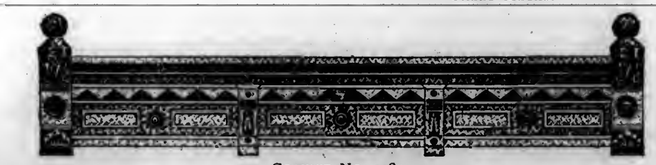

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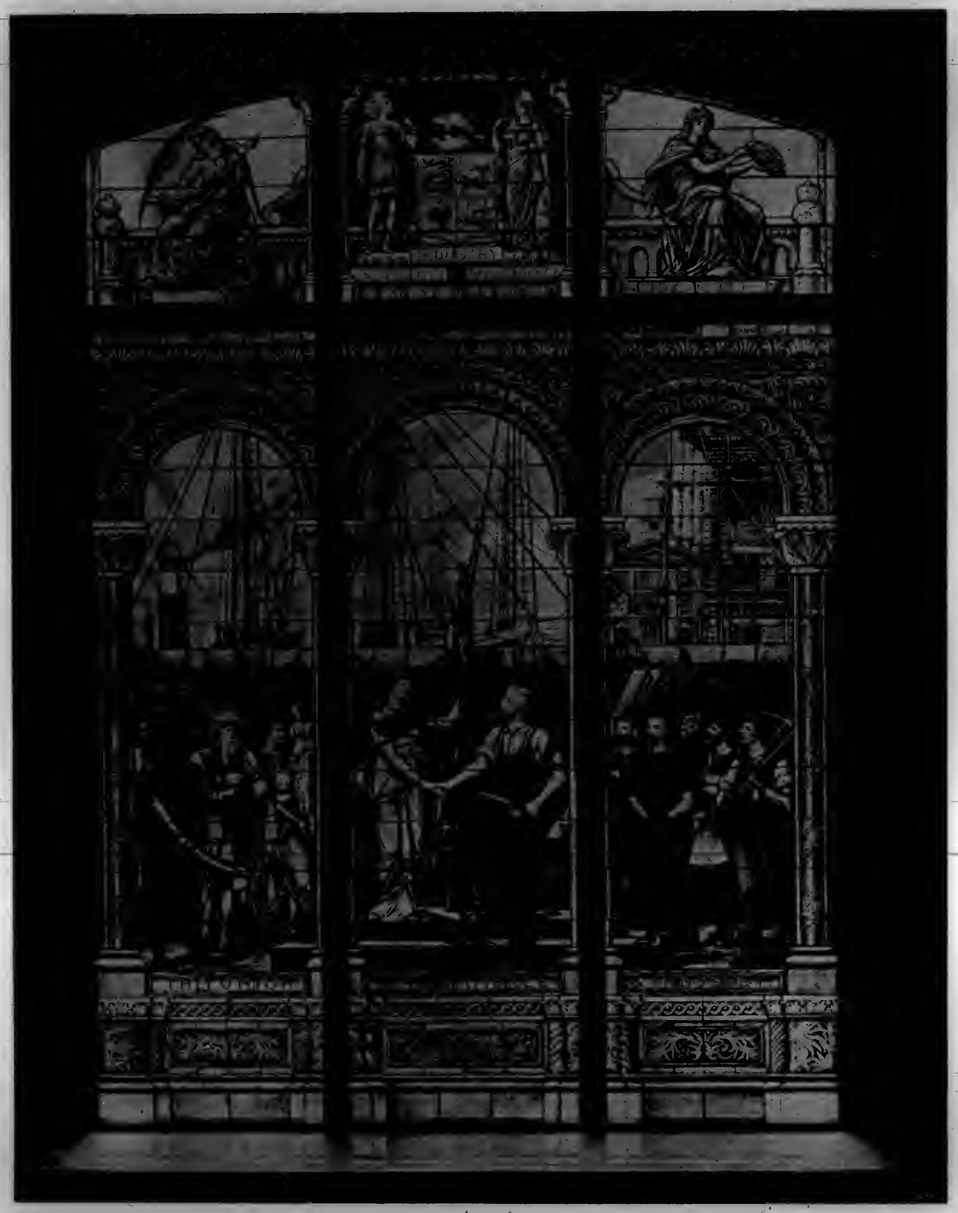
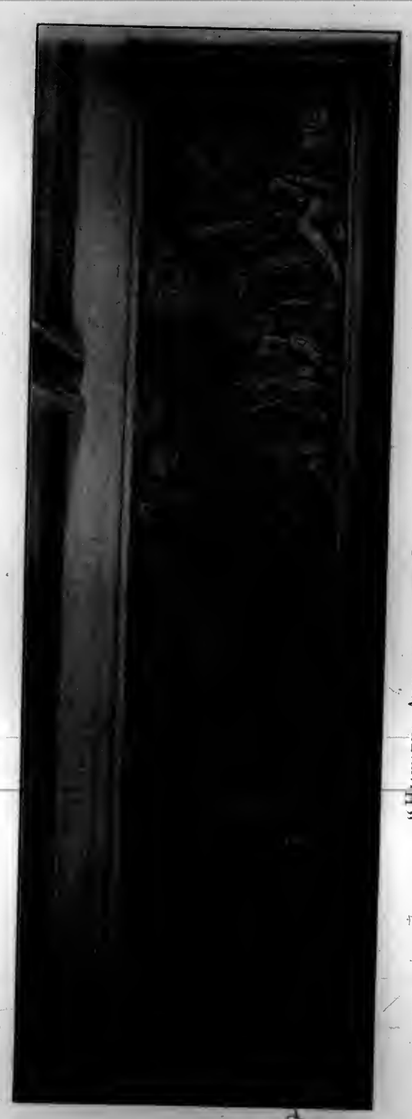


STAINED GLASS WINDOW, NEW MUNICIPAL BUILDINGS, TORONTO.

DESIGN BY ROBERT MCCAUSLAND.

"PORTAGING UP THE ST. LAWRENCE IN THE EARLY PART OF THE 17TH CENTURY."



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CANADIAN ARCHITECT AND BUILDER.

VOL. XII.—NO. 10. OCTOBER, 1899 PRICE 20 CENTS. $2.00 PER YEAR.

—THE—

CANADIAN ARCHITECT AND BUILDER,

A Monthly Journal of Modern Constructive Methods,

(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD).

PUBLISHED ON THE THIRD WEDNESDAY IN EACH MONTH IN THE INTEREST OF

ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

The C. H. MORTIMER PUBLISHING CO. of Toronto, Limited,
Publishers,
Confederation Life Building, - TORONTO, CANADA.
Telephone 2362.

Branch Office: NEW YORK LIFE INSURANCE BUILDING, MONTREAL.
Bell Telephone 2299.

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The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to foreign subscribers is $2.50. Subscriptions are payable in advance. The Journal will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrears of subscription paid.

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The Passing of Mill Construction.

THE result of fires in several large buildings in Chicago constructed on what is known as the slow-burning or mill construction principle, is of such an unsatisfactory character, that a sub-committee of the Board of Fire Underwriters has been appointed to investigate and report on the value of this method of construction as a means of resisting fire. For years the Underwriters' Association have made a liberal reduction in insurance rates to the owners and occupants of such buildings, but the opinion is gaining ground of late that structures built on this principle are as incapable of resisting fire as are those of ordinary construction, and consequently that the lower insurance rates hitherto accorded them should be withdrawn.

The Destruction of New Westminster, B. C.

THE report of Judge Harrison, who was appointed a commissioner to investigate the causes of the conflagration which destroyed the city of New Westminster, B. C., concludes with the following statement: "Lack of funds, trying to economize, and the desire not to lessen the supply of water to consumers, induced the council to experiment with the waterworks system, contrary to the advice of the construction engineer, without finding out from some competent source whether he was right or not, and disabled the waterworks for fire protection, and want of funds and trying to economize led to the

failure to keep up in first-class efficiency the fire department and what other means they had for fire protection." The experience of New Westminster should be a sufficient warning to municipalities not to set in the scale the saving of a small yearly expenditure against the safety of millions of dollars worth of property. Any reasonable expenditure is warranted for the maintenance of an efficient fire department, more particularly in new centres of population, where wood construction chiefly prevails. We trust the time is not far distant when fire-proof materials will be employed to a much greater extent than at present. Should this occur, a less expenditure would perhaps be required for fire protective equipment.

The P.Q.A.A.

THE annual convention of the Province of Quebec Association of Architects, held at Quebec on September 23rd, was devoid of special interest, and was not largely attended. The most important matter with which the Association is called upon to deal, is if possible to enforce compliance with the Quebec Architects' Act, which provides that no person shall practice architecture in the province who is not registered under the Act as a member of the Association. The report of the Council states that the Association have experienced difficulty in securing the necessary legal proofs to enable them to proceed against offenders, and in dealing with this matter are being guided by the advice of legal counsel. We believe the Council to be fully cognizant of the important bearing of this question upon the future welfare of the Association, and that it will receive at their hands the most careful consideration. It is a vital point, and we trust means will be found to guard it. The officers for the ensuing year have been wisely chosen. Under their direction the Association will doubtless maintain its progressiveness and widen its field of usefulness. It was suggested by Prof. Capper that the Association might profitably undertake the publication of a volume to illustrate the old colonial architecture of Quebec. It was further suggested by Mr. Venne that an exhibition of building materials would form an interesting feature of the next convention in Montreal. No action was taken by the Association with regard to these proposals, but they will no doubt receive due consideration from the Council. It is proposed to formally open the new rooms of the Association on the 31st inst.

Architects' Fees.

THERE is needed in Ontario a standard of architects' fees which shall be recognized by the courts. Further than this, there is required on the part of the architects themselves a spirit of loyalty to one another and a determination to uphold as far as possible the generally nuderstood ethics of the profession. A case which recently came up for hearing in the courts serves to emphasize this contention. An architect sued to recover fees from a client at whose request he had prepared preliminary surveys, sketches and complete working drawings for a factory building, and sketches, working drawings, specifications and estimates for an associated building. For the first he charged 2 per cent. and for the second 2½ per cent. of the estimated cost. The defence brought as witnesses two architects who testified that their charge for similar work would hvae been one per cent. and one half per cent. respectively. The judge enquired of the plaintiff if there was any legal tariff of charges of fees for an architect's services, and was answered in the negative. He then asked on what ground the plaintiff expected to be paid a higher fee than other architects had stated they were accustomed to receive. The plaintiff, seeing that the case would go against him, took advantage of an opportunity which presented itself and secured a settlement out of court, under which the defendant paid a larger amount in legal expenses than the plaintiff would have been willing to accept in full settlement for his services, while the architect got nothing. It is to be regretted that architects should be found willing to go into court and give evidence prejudicial to the interests and rights of a member of the profession. The evidence given in this case was calculated to lower the standard of fees endorsed by the Ontario Association of Architects and other professional bodies—and there is the possibility if not the probability that the gentlemen who permitted themselves to be placed on record with regard to the value of an architect's services may some day find themselves in the unpleasant predicament of being confronted in the courts by their own testimony and asked to accept their own verdict.

Defective Construction.

The accident at the Coliseum building in Chicago, on the 28th of August, when twelve steel arch trusses erected to support the roof collapsed, causing injury and death to a number of the workmen, emphasizes the necessity for the exercise of exact knowledge and much care in large constructions such as are common in the present day. Many architects lack the knowledge of strains and stresses which is so requisite a factor in safe building. The disposition is too prevalent to depend upon printed calculations in hand-books. Much of this data was compiled a quarter of a century ago, and is altogether inapplicable to the changed conditions now existing. The architect should himself carefully figure out the requirements of each individual case with which he is called upon to deal, in order that the best and most economical methods shall be adopted. Our attention was recently directed to a building in course of construction in which the architect had used as supports on the four floors columns of exactly the same diameter and thickness of iron. The floors were required to carry a load of 150 pounds to the square foot, but proper calculation showed that provision had been made for a load of only 52 pounds. It therefore became necessary to replace the columns with others of varying diameter corresponding to the loads to be carried and also to considerably increase their number. Glaring defects are noticeable in some of the steel construction work erected during the present season. Instead of bolting the end of each iron beam directly to the upright member, thereby tying the structure together, the common practice is to place such beams on three inch angle irons attached by a couple of bolts to the vertical supports. Presumably this method is employed to save the cost of hand-drilling. It has been noticed that the architects of most experience with iron construction will not permit their work to be put up in this manner. The building by-laws in our leading cities are entirely out of date, and do not prescribe the manner in which modern steel construction work shall be carried out, nor is proper inspection made of such work. The only safeguard against accident is the knowledge and faithfulness of the architect. Under these circumstances it behooves every architect to study with greatest care this phase of his work, and neither permit himself nor those with whom he may be associated to employ haphazard methods.

TORONTO CITY HALL.

Golden key used by the Mayor at the formal opening of the new Municipal Buildings. Designed and Presented to the City by Messrs. Ryrie Bros., Toronto.

THE formal opening of the Toronto City Hall has at last taken place, and although after the manner of such buildings the carver is still at work and there is other work to do to make the building look complete, it is at least populated. The Toronto city officials have hitherto been painfully lacking in that luxuriousness of accommodation in working hours which is usually the fortune of civil servants. But all that is changed, and the clerk, who formerly spent his days in a low, dark and rather fusty room, with a prospect to one of the side streets below the market, and now finds himself in spacious and lofty quarters, with large windows looking to the genial south and the genial activity of Queen street, must feel all the fresh delight with which a convalescent, when he emerges from seclusion, looks upon the world. It has been questioned whether sufficient spaciousness and loftiness for the officials' needs, and sufficient splendor for the city's honour, could not have been obtained for the original estimate of $1,650,000. It certainly is a handsome sum; but to judge fairly if less would do, and what less would do, and what less it would cost if it would do, is beyond an outsider, unless he is prepared to undertake labor about equal to that of learning a language. Nor has the history of the rise in cost been clearly given to the public, so that they may understand its reason and reasonableness. But the resulting structure is before us to judge of and calls for remark.

Whatever may be said in criticism of the work this must be said in its praise, that comparison with the Ontario Parliament Buildings, by Mr. Waite, of Buffalo, a work similar in size and character, disposes of the doctrine formulated when the Parliament Buildings were proposed—that it is not safe to trust to a Toronto architect work greater than has been executed in Toronto before; that for unusually large work it is necessary to employ an American architect. The unfortunate result of the employment of Mr. Waite has been before us for some years as evidence in the negative, and we have now positive evidence, in Mr. Lennox's completed work, that a Toronto man can rise to an occasion. Mr. Lennox's work is the work of an architect, while Mr. Waite's looks like that of a draughtsman. Indeed it is exceedingly likely that the work of a draughtsman is what it actually was. The American work getter has no time to be given to the slow processes of design, and his mind must be to a great extent off that bent. We have little else to expect, in dealing with the class of American architect into whose hands promoters of new building enterprises here are likely to fall, than that a draughtsman will be the creator of the design. The City Hall on the contrary has been not only personally designed but personally superintended, and whatever we have to say in criticism is about the design, which is a matter of taste and of which there is more than one solution, not about the construction, which is a matter of attention to facts, and of better ways or worse ways; of this it is the opinion of experts who examined the building in connection with the law suits with the contractor, that the work is done throughout in an admirable manner, and we may dismiss the question of construction with an expression of belief that about it nothing can be said but praise.

One fatal deficiency there is in the construction—that it is not fireproof. In the early stages, when it was discovered that economy was not going to have a voice in the matter, this necessary and repaying outlay should have been resolved on. It was not too late to make havoc of the architect's external treatment in order to meet this internal expense. Unrestrained lavishness is seldom as great a begetter of beauty as are limiting conditions. It is the necessity for making much of what he has that turns the designer's attention to concentration of effect which is breadth, the greatest quality in architecture.—This is lacking in the City Hall. There is too much on a facade, and the force of the design is somewhat weakened by it. The characteristic quality of the Richardsonian Romanesque is solidity of wall. Against this must be set the modern

THE OLD CITY HALL—1844-1899.

Sketch Showing Original Design for Tower.

desire for abundance of light, making it a question whether this style is really a suitable style for modern work. There is war between the need for windows and the need for wall. Richardson seems to have got over the difficulty by severe restraint in the use of ornament—not economy by any means, but such due restraint as not only carries out the maxim that ornament shall reinforce the design rather than attract attention to itself, but seems to go a step farther and subordinate the scale of the ornament to the scale of the constructive features and surface; so as to make the very most of the wall. As far as one can judge from photographic reproductions, the court house at Pittsburgh—the prototype not only of the Toronto City Hall but of American municipal buildings erected in the last ten or twelve years—presents an appearance of not severity only but extreme severity. The building is of light coloured granite throughout, from the base to the apex of the tower roof, all of granite and all of one color. There are no excrescences, and but slight projection to the cornice; the mouldings and capitals are described as cut very flat, and what mosaic work there is consists of pattern stones defined by their joints merely, without color. The sootinesss of Pittsburgh as well as the nature of the material may have had something to do with the flat treatment of this building, but the small scale of ornament and the severity of wall are thoroughly characteristic of Richardson's highest development. Other work of his of the same period, such as the Marshal Field building and the residence of Franklin MacVeagh, at Chicago, have the same characteristics. If, therefore, the tendency to over-ornament, which Richardson's imitators seem to have extracted from his work, was ever to be found in his work, it was not to be found in its highest development. One cannot say with certainty that Mr. Lennox's work is over-ornamented, except in so far as it is over-windowed too. The gain to the front, if it could have less windows, may be seen in approaching it from the west, where the blank side of the tower and the side of the turret become prominent and blot out some of the windows. If reduction or compact grouping of the windows is impossible, the cue for the Richardsonian designer certainly seems to be a very careful and restrained use of ornament. Time will help the designer in this case. Age is a powerful harmonizer of wall surfaces. The process has already begun in the City Hall.

It would have simplified the composition of the front if it were not necessary for the tower to appear there, or if the tower could have been centralized so that the gable and repeating turret would not have been required. The governing necessity is of course the position of Bay street, down which the tower shows with a fine effect. But this off centre position of the tower has increased very much the difficulty of designing the front. The tower itself has been limited so that it is questionable whether, if the building could be seen from a point of view such as that from which the original perspective view was taken, the tower would not appear too slender for the mass of the building. This drawing, which is still perpetuated as an ornament for kalendars, etc., does little justice to the actual appearance. From any point from which the tower can be seen in connection with the building, or from distant points whence the tower is seen alone, its proportions are quite satisfactory. The only solution for a greater relief of the front from features, would have been to make the tower rise from the inner side of the building. Theoretically the position is a good one, giving an appearance of solidity of mass to the building: and the opportunity afforded for a broad treatment of the front would be tempting. But in practice architects prefer to make the most of the tower itself by showing it down to the ground. Richardson's competition perspective for the Pittsburgh Court House, shows the tower rising from the interior court; but, in representations of the completed building it appears on the outside. The large clock face is evidently a late decision thrust upon the tower after it had been carried up to that point according to the original design with a small clock face. The result is a design somewhat disturbed, and one misses the reinforcement of angle above the springing line of the clock face. But the large face is fine in itself, and as it can be seen from all parts of the town, it has a practical reasonableness which makes it a satisfactory feature. It is probable also that the increased scale which it gives is an advantage to a tower which, as has been said, appeared in the perspective to be on the slight side.

It is to be hoped that some day Mr. Alderman Hallam's proposition to insert musical chimes in the belfry will be carried out. The patriotic airs, which Mr. Hallam suggests for the repertory of the chimes, are however not the most suitable kind of music for the purpose. The music of mechanical chimes is essentially that of a musical box. It is the mistake of modern musical box manufacture to set the cylinders to popular music composed for songs and marches. It is for this reason that the grand modern musical box is on the whole so disappointing. The cylinder and comb, or cylinder and bells, are not suited for the production of orchestral and band music, or airs designed for the human voice; the instrument has a genius of its own which is much better brought out in the early "musical snuff boxes," as they were called, in which the music is all of the running character, suited to the instrument, and seems to have been composed for the purpose. Even the bald octave chime of English churches is characteristic and fine in its way, and the wavering of the wind only adds to its beauty; but the hymn tunes which we attempt in this country and the United States are bald affairs and apt to go out of tune with every gust of wind. The objection raised by some one, that chimes in the belfry would interfere with the deliberations of the city council below, would be answered if the objector should visit one of the belfry towns of Belgium and hear how light the chimes are in the air. Indeed it is only necessary to go to St. James' Cathedral in Toronto, where the chimes for the quarters and the hour go on all through the service without disturbing the worshippers.

Of the inside of the City Hall there is not much to say, and little to say in praise of the finish. Scagliola columns with plaster capitals are not worthy of the occasion; but their attempt to appear as marble is almost a merit beside the downright vulgarity of the woodwork—large grained oak or ash, slash cut, filled with dark filler and varnished to shine. The scale of design of the wood-work is no better than its material and finish. Whether the architect is responsible for this or the modern and much mistaken system of handing over wood finish to the wood fitter we do not know. Feeling for wood work in monumental style is not to be got out of any hands but those of a good designer.

The interior at present shows cold and white in hard finish plaster. The value of Mr. Reid's wall paintings inside the entrance becomes all the more apparent. If the other panels in the entrance hall were filled in the same way there would be at once just such an immeasurable improvement as there is in the streets when the leaves come out in the spring. It is to be hoped that a small annual appropriation will be made for the purpose of decorating by degrees at least the entrance hall and the council chamber.

Branch Office of the CANADIAN ARCHITECT AND BUILDER,
New York Life Building, Montreal,

OCTOBER 13th, 1899.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

The annual meeting of the above Association opened at 10 o'clock a.m. on September 23rd, in the City Hall, Quebec, and terminated on the evening of the same day. The City Council Chamber was kindly placed at the disposal of the Association by the Mayor of Quebec, the Hon. S. N. Parent, whose courtesy was acknowledged on the part of the Association by a cordial vote of thanks.

The attendance was as follows:—A. Raza, president; Prof. S. H. Capper, 1st vice-president, Montreal; G. E. Tanguay, 2nd vice-president, Quebec; Jos. Venne, secretary, Montreal; L. Z. Gauthier, E. Maxwell, G. A. Monette, A. H. Lapierre, Alcide Chausse, A. R. Decary, J. S. Archibald, Raoul Lacroix, Montreal; Thomas Raymond, J. H. Leben, Chas. Baillarge, Chas. E. Gauvin, F. X. Berlinguet, H. Staveley, J. E. Larochelle, J. P. E. Dussault, J. G. Bussiers, J. H. Peachy, A. H. Larochelle, R. P. Lemay, Quebec.

The meeting having been called to order by the President, the annual reports of the Council and of the Treasurer were presented, as follows:—

NINTH ANNUAL REPORT OF COUNCIL.

In presenting to you the ninth annual report of their proceedings, the Council of the Association have to call attention to the several projects which they have had under consideration during the year, rather than to the achievement of any special object, as last year, when the new charter was obtained from the provincial legislature. The work of the Council, however, it is hoped, will have tended to the prosperity and progress of the profession, and o the benefit, therefore, of the public generally, whose interests are necessarily identified with sound practice in architecture, both public and private.

As now organized the Association must aim at raising the standard of professional practice, not alone from the merely utilitarian standpoint, but also from the æsthetic; the history of architecture in the past demonstrates conclusively that the architect most worthy of the title joins artistic conception of the highest order to practical utility in his work; buildings artistically faulty are architecturally bad; for examples of this truth we have not (unfortunately) to go outside the limits of our province of Quebec.

During the past year an amendment to our new charter has been accepted. As originally proposed in the legislature, this would have compelled the Association to admit to full membership, without examination, all who had studied for three consecutive years (instead of four) in an architect's office. This the Council might have opposed outright, but it was thought better to propose an amendment allowing all students who were actually engaged in the study of architecture, on registering their names, the privilege of coming up for qualifying examination at the expiry of four years of apprenticeship (thus avoiding the preliminary examination). The amendment was passed and seven students have taken advantage of it.

At the January examination held in Quebec three candidates succeeded; at the examinations of July in Montreal one candidate passed the preliminary examination and one failed, while two candidates who took the final examinations failed partially.

In future the Council would urge that very special attention should be bestowed upon maintaining the high standard of these examinations; it must be borne in mind that they form the basis of our organization and that only by them can we ensure the fulfilment to the public of the obligations imposed upon us as a corporation by our charter.

The Council has devoted earnest attention to the question of instituting proceedings at law against those illegally practising as architects within the province. The Council is in receipt of communications and newspaper extracts pointing to such irregular practice, either on the part of citizens of other countries or of others who have neglected to conform to the different acts of the legislature relating to our Association, or who have not paid their dues to the Association, or who have not qualified by passing the requisite examinations.

In the opinion of our legal adviser we are not at the present moment in possession of legal proofs so convincing as to justify legal proceedings being taken. The Council accepts the opinion of its legal adviser that for a test case it is important to select one in which the evidence is abundantly clear and convincing; unless further powers are directly conferred upon the Council for this purpose at the annual meeting of the Association, the Council is of opinion that a suitable occasion must be awaited before instituting such legal proceedings.

Meanwhile, however, important preparatory work has been done; circulars have been addressed to those suspected of irregular practice; a copy of the charter (as amended) placing on record the actual legal position of the profession in the province, together with the official list of members of the Association, has been distributed to the public.

Representations have also been made to the Minister of Public Works concerning public employees who assume the title of architect without having conformed to the requirements of the law.

The Council have again made a special effort to induce the government to recognize officially the modified tariff of professional charges as now in force within the Association. The government submitted to the Council an amended tariff, which the Council deemed unacceptable. In consequence the Council was received by the Ministers in Council, who, after discussion, appeared to be in principle favorable to our demand; no definite decision has, however, as yet been given us, though we are hopeful that we shall be accorded what we deem a measure of simple justice, not only to us, but even to those who haae occasion to utilize our professional duties.

The Council has appointed a Special Committee with a view to increasing the Library of the Association so as to render it of real service to the members. To the generous gift of one hundred dollars, as announced by the Secretary at last annual meeting, the Council added an equal amount to form a nucleus for the library fund. The money has been spent on the purchase of standard books. The Council, after a careful consideration of the financial position of the Association for the present year, has voted one thousand dollars to be expended upon the library.

In connection with the library, the Council has to acknowledge a government grant of copies of the statutes of the Province of

Quebec for the years 1890 to 1899 in Duplicate for the use of the Section of Quebec and for Montreal.

The Council has had the satisfaction of arranging that the books of the library shall be catalogued under a general scheme, now in course of development, by which the libraries of this Association and of the Art Association of Montreal, as also the Art and Architectural portions of the McGill University and of Westmount, shall all be grouped together. This comprehensive scheme cannot fail to be of advantage to all students: it will avoid unnecessary duplication of books and consequently husband the resources of the smaller libraries.

The Association was invited to take part in the French Universal Exhibition of 1900, and the Council on two occasions consulted the members of the Association by circular upon the subject. No encouragement whatever was received by way of answer, and the Council reluctantly decided to abandon the project, while feeling convinced that to have been adequately represented on so important an occasion would have been of great advantage to the profession.

The rooms of the Association are removed to a more suitable and agreeable locality, and the rooms have been suitably furnished with a view to their being more generally available to and by all the members of the Association. No formal opening has yet taken place, the rooms having been ready only somewhat late in the season. The formal inauguration may be suggested as a matter for the new Council to take up on its appointment.

Your attention is called to the suitability of the new rooms for special meetings, such as arbitrations, especially when these are of a private character or require considerable accommodation for large numbers. Members who approve of this suggestion and avail themselves of it can contribute a share to the prosperity and usefulness of the Association beyond the mere revenue accruing, which is necessarily small; such use of the headquarters of the Association, it is felt, will tend to promote "esprit de corps" within the profession.

The Constitution is now printed and will at once be distributed to members. Considerable labor and time have been bestowed upon it.

We have had to record with regret during the past year the death of Mr. A. G. Fowler, who was among the founders of the Association.

The Association has 139 active members, of whom six were registered since last general meeting.

There was no general meeting this year; there were 7 special meetings and 10 regular meetings of Council, at which the attendance was as follows:—

Alf. Raza,	President,	Montreal.	16
Prof. S. H. Capper,	1st Vice-President,	"	10
G. E. Tanguay,	2nd " "	Quebec.	0
Jos. Venne,	Secretary,	Montreal.	16
W. E. Doran,	Treasurer,	"	11
J. F. Peachy,	Counsellor,	Quebec.	0
E. Maxwell,	"	Montreal,	13
G. A. Monette,	"	"	10
M. Perrault,	"	"	9
J. S. Archibald,	"	"	14
A. T. Taylor,	"	"	4

JOS. VENNE, Secretary. A. RAZA, President.

REPORT OF QUEBEC SECTION.

The undersigned, officers of the Quebec Station, "P. Q. A.A.," hereby have the honor to submit to the Council the annual report of said Section for the year 1898-1899.

The Quebec Architects have held monthly meetings, where were discussed local matters interesting the profession in general, and more particularly the Quebec members. On the 2nd of February, our members assembled to consider a measure brought before the Provincial Legislature, as an amendment to our Charter, and report the case to the Council. Thanks to the combined efforts of all, we succeeded in preventing the passing of that amendment, as previously expressed, which was an attempt to lessen the privileges of the Architects, and more especially those who had acquired the title by undergoing the required examinations.

The Quebec Section has taken due notice of the accident that occurred to the Nicolet Cathedral and Montreal Civic hospital, and took advantage of those disasters to suggest that the Council representing to the Government the necessity of appointing as Inspectors of Public Buildings, only Architects, members of the Association, and duly qualified for such important functions, and to oblige the proprietors of such Public Buildings to have plans made by Architects (as the law requires.) For that purpose, we have suggested that the Council supply the Archbishops and Bishops of our Province, as well as the Archbishops of Ottawa, with an official list of the members of the "P. Q. A. A."

Our Section has also drawn the attention of the Council to the fact that, amongst others, two persons were practising as Architects in Quebec, and were advertising as such in local papers, without being members of Association,—asking the Council to take proceedings against those gentlemen,—which has not yet been done, for reasons given by the Council.

M. Tanguay, our President, has, in behalf of the Council, asked the Government for two series of the Revised Statutes of the Province, one for Montreal, and one for Quebec; he has been answered favorably, and these series were sent recently.

The above respectfully submitted.

JOS. P. OUELLET, Sec. Q. S. G. EMILE TANGUAY, 2nd Vice-President.

QUEBEC, August 12th, 1899.

On motion the reports were unanimously adopted.

Messrs. J. E. Larochelle and J. H. Lebon having been appointed scrutineers, the election of officers was proceeded with, the result being as follows:

President—Prof. S. H. Capper, Montreal.
1st Vice-President—G. E. Tanguay, Quebec.
2nd Vice-President—Jos. Venne, Montreal.
Secretary—G. A. Monette, Montreal.
Treasurer—W. E. Doran, Montreal.
Councillors—A. Raza, Montreal; J. S. Archibald, Montreal; E. Maxwell, Montreal; H. Staveley, Quebec; Alcide Chausse, Montreal; A. H. Lapierre, Montreal.
Auditors—A. R. Decary, Montreal; R. P. Lemay, Quebec.

At 2 p.m. the meeting adjourned for luncheon.

The afternoon session opened with the newly elected president in the chair. It was largely devoted to consideration of means of securing compliance with the requirements of the Quebec Architects' Act, and a proposal that the Association should publish an album illustrating the old colonial architecture of the province.

In the evening some of the members dined together at the Frontenac Hotel.

PROF. S. H. CAPPER.

The new President of the Province of Quebec Association of Architects is a graduate of the University of Edinburgh. In 1887 he was admitted by examination a student of the School of the Beaux Arts, Paris. From 1887 to 1891 he practiced architecture in his native city of Edinburgh. In 1891 he was admitted an associate

PROF. S. H. CAPPER.

member of the Royal Institute of British Architects, and shortly after became a university extension lecturer in connection with the University of Edinburgh. In 1896 he was appointed examiner in the Faculty of Arts for the department of archaeology and art history of this university. In the same year he accepted the position of Professor of Architecture in McGill University, which position he still retains.

ONTARIO ASSOCIATION OF ARCHITECTS.

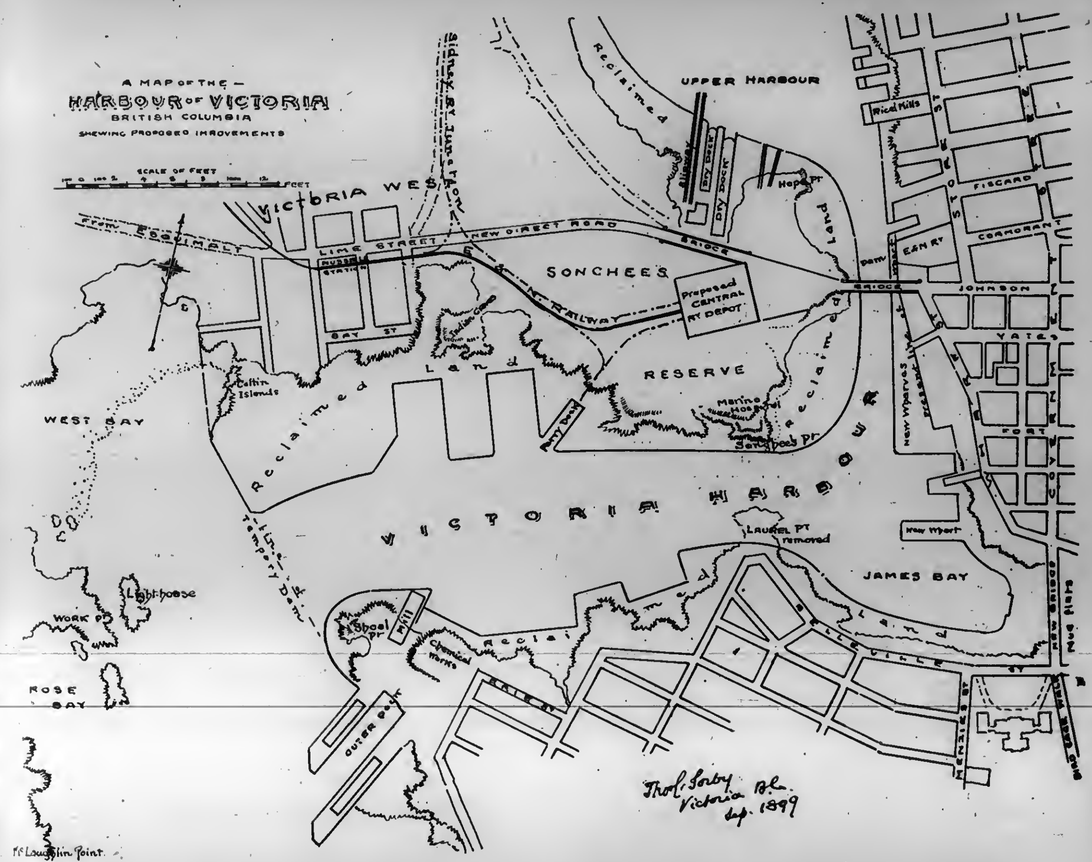
Preparations are being made for the convention on January 16th. Members are invited to send in drawings or photographs of their year's work for a stereopticon exhibition, such as has been made in former years. If those who have photographic negatives of their work will send them, this will much reduce the labor and expense of preparing lantern slides. The registrar will receive, care for and return all contributions for this purpose.

There has recently been added to the library a practical treatise on plumbers' work entitled "Modern Plumbing, Steam and Hot Water Heating," by Jas. J. Lawler. An omission from the catalogue distributed this summer is, "Heating and Ventilation," by G. S. Billings.

PROPOSED HARBOR IMPROVEMENTS AT VICTORIA B. C.

The scheme herewith presented for the reclamation and improvement of the harbor at Victoria B. C., has been evolved by Mr. T. C. Sorby, architect, of that city, and has met with the general approval of the citizens. The accompanying map clearly illustrates the character of the proposed improvements, the cost and particulars of which are set forth in the following extract from the Victoria Times:—

The greater portion of the harbor is at present neither land nor water, and the passage available for steamers is tortuous, never 300 feet wide, crowded with rocks and shoals on every side. The proposition is to remove all these rocks and shoals, and to use them in the reclamation of solid land and to deepen the whole area of the harbor, from the open at Maclaughlin Point to 30 feet at low water, and to increase its available width and area.



It is proposed to close the lower harbor by temporary dams, to pump out the water, hydraulic and excavate an area of about 167 acres to a depth of 30 feet, enclosing it with a wall built up of the rocks now impeding navigation, and filling in the balance behind with the waste excavated material, thus reclaiming about 122 acres of land that would become some of the most valuable property in the city. This reclaimed land in the upper and lower harbor will together have a frontage towards the water of about five miles. Very little material would be required in the construction of the work beyond that now actually lying at the bottom of the harbor. If the mud thrown out was found to be foul, a liberal but inexpensive use of quick-lime would remove all nuisance. There is enough rock and boulder now encumbering the harbor to build the most substantial walls round the lower harbor. There is enough sand, gravel and mud to fill in behind these walls to a height of about four feet above ordinary high-water mark. The granite for the coping is the only stone required to be brought from the outside, and this could be worked at the quarries and set from barges after the harbor was open.

The temporary dam at the mouth of the harbor would have an opening left in the centre about 85 feet wide, and could be completed without interfering with the shipping entering or leaving the harbor. The central opening would be closed by caissons during one tide, whenever all was in readiness. The dam with its extensions would form a temporary landing quay about 40 feet wide. These works and others of preliminary nature, as installation of pumps, etc., to the extent of possibly $500,000, could be proceeded with before the closing of the harbor. To this must be added the cost of expropriating the land abutting on the harbor, so that a very considerable sum of money would be placed in circulation in the city at an early stage. The purchase of the land would carry with it all wharfage dues (independent of all questions of ware-housing), from which an immediate income of about $150,000 per annum would be derived—equal to 7 per cent. on the total outlay to the date of closing the harbor.

When all the preliminary works were complete, and all in readiness for active operations, the harbor would be closed and the pumps started, and the water removed in ten days. All mud, sand and gravel would be hydrauliced and distributed over the reclaimed area (as successfuly done at Seattle and Tacoma) prior to or simultaneously with the emptying of the harbor.

In addition to these works pertaining to the construction of the harbor proper, inside a line drawn from Shoal Point to Coffin Island, there would be dredging from this line outwards, and deepening the entrance to 30 feet as far as opposite Maclaughlin Point, where the water shelves down rapidly to 40 feet at low tide.

It is only a matter of time when the railway offices on Store

street will be abandoned in favor of a more important and commodious terminal depot on the reserve. The old railway bridge would be removed, and a broad bascule bridge erected at the foot of Johnson street, with wide central opening, clearing the stream at its narrowest point of all impediment to navigation, and at the same time meet the long-felt want of a direct route from the centre of Victoria city to Victoria West and Esquimalt.

It is part of the proposition to connect the present V. & S. railway by a branch running along Work street and over the new bridge at Point Ellice, with the central station on the Indian reserve, and also to extend these joint railways by harbor tracks along the wharves as far as the outer dock; to construct coal bunkers in the lower harbor, and spacious dry-docks and marine ways in the upper harbor of capacity sufficient to take the largest ships frequenting these waters. The harbor tracks would be fitted with hydraulic cranes and capstans. Spacious warehouses would be built as the demand arose, and all the most approved appliances installed for the most economical and expeditious handling, storing and transhipping of freight, and for the accommodation of the shipping frequenting the port and at the same time the charges kept down to rates that should make this the most desirable and most frequented harbor on the Pacific coast. These works would be gradually carried to completion out of surplus revenue.

ESTIMATE OF THE COST.

Purchase of all properties abutting on the harbor, including compensation, say		$2,100,000
Dams and removal, about	$200,000	
Pumping out lower harbor	20,000	
Excavation and dredging	630,000	
Revetment walls	800,000	
Bascule bridge	200,000	
Overflow to Thetis Cove, say	50,000	
Contingencies, say	200,000	
Total works in lower harbor		2,100,000
Sheet piling, upper harbor	250,000	
Dredging	175,000	
Rock Bay bridge abutments	50,000	
Point Ellice bridge	200,000	
Contingencis, say	65,000	
Total works in upper harbor		740,000
Law, parliamentary, engineering and management for the four years' construction		350,000
Estimated total outlay, about		$5,290,000

This expenditure would be extended over four or five years, the bonds being issued as the demand arose, and although the bulk of the income would accrue on the purchase of the property, the charges for interest on the loan would rise but gradually, with the expenditure on works of improvement that would in themselves be revenue-producing. Thus the revenue during the first four years would, it is estimated, exceed $560,000; whereas the interest on the gradually issued bonds would not exceed $470,000 the surplus revenue being carried to capital account, thus reducing the amount required to be obtained on loan by about $90,000.

Instead of any direct grant of money from the city in aid of this great public undertaking, it is proposed that the city should convey the mud flats and other adjacent vacant spaces, that they could be filled up and converted into useful public property, from which an annual rent could be collected, which property would in due course become taxable to the city.

For many years past the Dominion Government has voted $10,000 to be spent in this harbor. It is proposed that the Dominion should increase this grant to $30,000 a year for a limited period of five years, commencing with the fourth year, that it may have a fair start in public usefulness.

The estimated revenue stands thus:

Rents receivable, about	$78,124	
Less taxes, etc	25,024	
		$52,500
Harbor dues from existing sources		95,000
Dominion grant in aid		30,000
Estimated average revenue from reclaimed land and harbor improvements, say		30,000
		$207,500
Interest on loan at 3¼ per cent., in the event of the full amount being expended continuously	$169,000	
Administration, maintenance, etc., say	30,000	
		$199,000

The exact results of the rate of interest and cost of work in the lower harbor would therefore determine the practicability of carrying out the work in the upper harbor contemporaneously or continuously with the lower harbor.

With reference to the repayment of the loan, the act provides that no surplus land shall be sold within ten years, but after that period, when prices may be considered established, any portion exceeding 60 feet away from the water's edge may be disposed of, provided the proceeds are applied solely to the redemption of bonds. It would not be desirable to pay off any more of the loan than these circumstances may render necessary, as foreign money obtained at low rates and profitably invested in local improvements is better retained in the country, and the requisite powers to renew any outstanding balance of the loan are provided in the act.

The scheme is in no way a company or speculative matter—it is purely a public enterprise for the development of trade, self-supporting from the commencement, and all surplus revenue will be applied solely for works of further development. The funds are now available, awaiting the Act of Incorporation, and the required public guarantees for the repayment of loan and interest over a period of fifty years.

The lower harbor will be the proposition to be dealt with, and the railway extensions will follow developments.

LEGAL.

KENNEDY VS. TRUSTEES R.C. SEPARATE SCHOOLS OF HINTONBURGH, ONT.—Appeal was taken by plaintiff before Mr. Justice Meredith at Toronto from part of judgment by the same judge at trial at Ottawa, dismissing the plaintiff's claim for extra work in connection with a building contract. The question was whether the architect's certificate for the extras claimed was sufficient for the plaintiff's recovery or whether he must show an order in writing for such extras given before the work was done, and upon whom the burden of proof as to such v itten order was. Appeal dismissed with costs. Per Meredith, J.J.—Some cases have gone a very long way in holding the owner to be bound by the certificate of his architect to pay for work which the owner has expressly stipulated with his contractor that he was not to be liable for, unless the order was given in a particular way, but if the owner is to be bound, justice would seem to require that the contractor should furnish clear evidence of a decision or adjudication by the architect as to the subject matter, from inquiry into which he is to be shut out by the certificate. In this case not only is such a decision or adjudication not made out, but the instruments relied on indicate that the architect has advisedly and carefully refrained from deciding or adjudicating as to the extras so as to bind the owner.

THE Architect and Contract Reporter, of London, quotes a decision of the English courts that will have an interest for builders everywhere. The paper says: "The risks from using defective mortar are numerous, for local authorities have in most places absolute power for dealing with it. A decision which was given this week by Mr. Justice Bruce, in Smith vs. Johnson, reveals that a building owner can also have his remedy against a contractor who is not careful in using such mortar as is considered necessary for safe building. The plaintiff contracted with the defendant for mortar which was to be used in the extension of a dormitory attached to a lodging house in Whitechapel after the completion of the work. The plaintiff was ordered to take down and rebuild the dormitory because the mortar did not correspond with the requirements of the Building Act. According to the by-laws the mortar to be used must be composed of freshly burned lime and clean sharp sand or grit without earthy matter in the proportions of one of lime to three of sand or grit. The dormitory was rebuilt as ordered. Then the plaintiff sought to obtain from defendant the money expended on the work as well as a sum for loss of rent. It was maintained that the quality of the mortar could not be detected because it was in a wet state. Counsel for defendant maintained that when the contract was made it was not understood that if the mortar was unsuitable it would be necessary to take down and rebuild the dormitory. Besides, the plaintiff should have rejected the mortar when it was supplied. Plaintiff's counsel held that the defective quality of the mortar could not be ascertained until it was used, and as the rebuilding was the result of defendant's acts, he must be held liable for the cost of rebuilding. Mr. Justice Bruce considered that, according to the evidence, as that the mortar was in a wet state, no reasonable diligence on the part of the plaintiff could have discovered the defects until the mortar was used. The plaintiff was therefore entitled to recover the expense of pulling down and rebuilding, as well as damages. His lordship assessed the amount at £101.

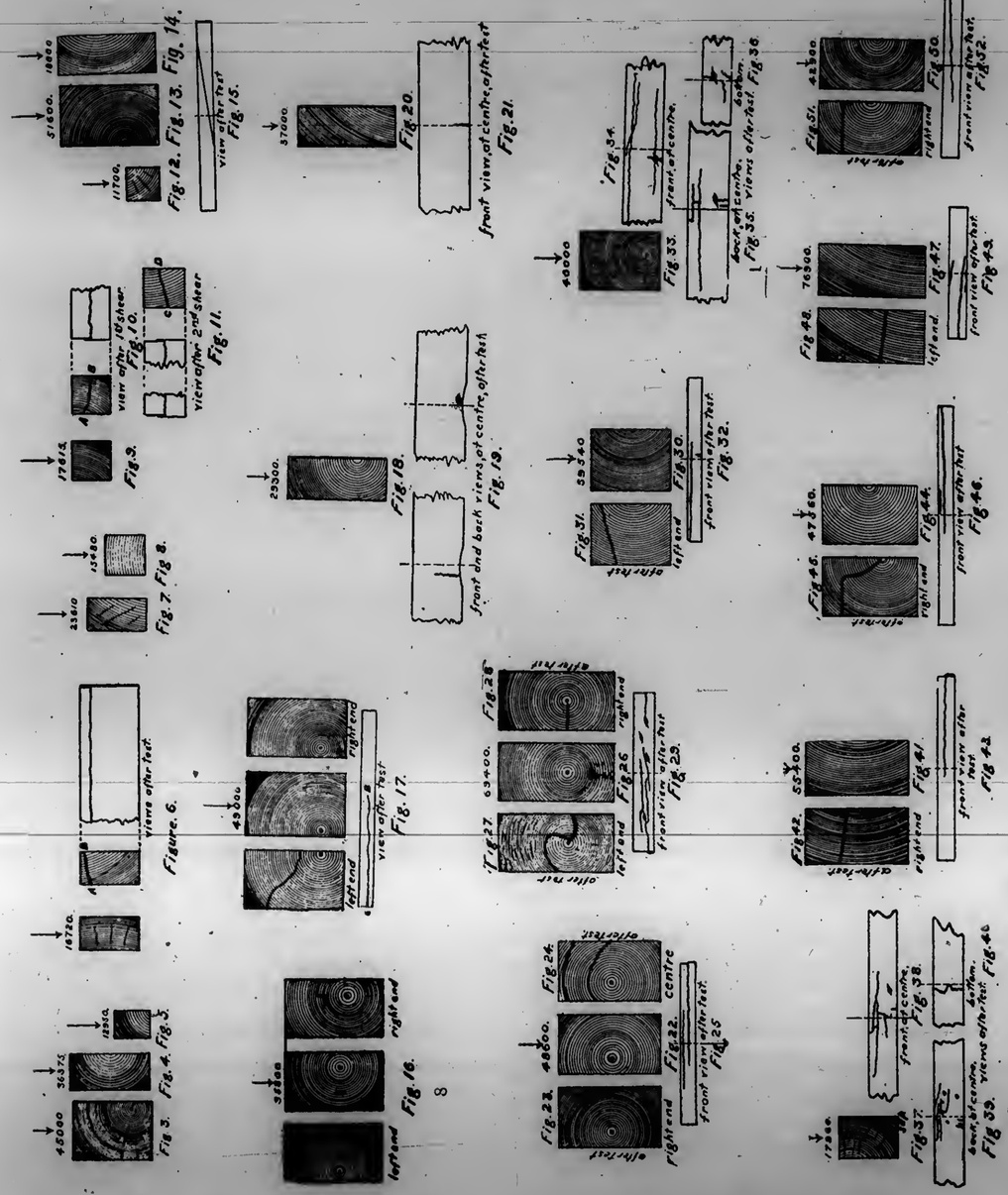
STRENGTH OF CANADIAN DOUGLAS FIR.

HEREWITH are given, in part, the results of tests made under the direction of Professor Bovey in the testing laboratory of McGill University, Montreal, to determine the strength of British Columbia Douglas fir. There were tested, in all, twenty-five beams, of which the following particulars and illustrations are given: Beam I was of good average quality, with annual rings as in Fig. 3. At 45,000 lbs. the beam failed by the tearing apart of the fibres on the tension face.

Beam II was of good average quality, with annual rings running as in Fig. 4. At 36,575 lbs. the beam failed by shearing longitudinally. After the fracture the load upon the beam was again gradually increased to 34,000 lbs. before a second failure occurred.

Beam III was of a specially excellent quality, with clear, close, parallel grain, perfectly sound and free from knots, with annual rings as in Fig. 5. At 12,950 lbs. the beam failed by shearing longitudinally.

Beams IV to VIII, sent to the laboratory by the British Columbia Mills, Timber & Trading Company, were cut out of trees grown on the coast section of British Columbia, and felled in the fall or during the



winter. They were free from knots, of good quality, and with the grain running straight from end to end.

Beam IV showed annual rings somewhat oblique, as in Fig. 6. At 16,720 lbs. it failed by shearing longitudinally along a plane A B at right angles to the annual rings. After the beam had sheared longitudinally the load was again applied until it amounted to 15,000 lbs., when fracture occurred by the tearing apart of the fibres on the tension tace.

Beam V showed annual rings as in Fig. 7, and failed byt he tearing apart of fibres on the the tension face under a load of 23,610 lbs.

Beam VI showed annual rings as in Fig. 8. Under a load of 15,480 lbs. it failed in the same manner as beam V.

Beam VII showed annual rings as in Fig. 9. Under a load of 17,615lbs. the beam sheared longitudinally along the plane A B, Fig. 10, the distance between the ends of the portions above and below the plane of shear being 3-16 of an inch. The load was again applied until it amounted to 11,840 lbs., when there was a second longitudinal shear along the plane C D at the other end, Fig. 11. After this second shear a load of 8,990 lbs. was applied, when the beam was fractured by the tearing apart of the fibres on the tension face:

In Beam VIII the annual rings were oblique, as in Fig. 12, and at a load of 11,700 lbs. it failed by the tearing apart of the fibres upon the tensinn face.

Beams IX to XVI were sent to the laboratoryby Mr. P. A. Peterson, chief engineer of the Canadian Pacific Railway.

Beam IX was grown on the mainland half way between Vancouver and New Westminster, in a flat country not much above the sea level. It was cut from a log 26 inches in diameter and 34 feet in length, felled in the month of May. The log lay in fresh water for ten months. It was of first quality, with grain straight and running parallel to the axis. It contained a season crack on the widest face about 11 feet long, 3½ inches below the edge and about 1½ inches deep. Annual rings were as in Fig. 13, the heart of the tree being in one of the vertical faces. Under a load of 51,600 lbs. the beam failed at the support by the tearing apart of the fibres.

Beam X, with annual rings as in Fig. 14, was cut from a log 32 inches in diameter grown on the mainland 120 miles north and west of Vancouver, on a hillside about 100 feet above the sea level. The log was felled in the winter and remained in salt water six months. The grain in this beam ran crosswise, and it failed by a cross fracture along the plane A B, Fig. 15, under a load of 18,000 lbs.

Beam XI—History same as that of beam X. Timber was of first quality, and grain parallel with axis. The beam contained the heart of the tree, with annual rings as in Fig. 16. Under a load of 35,800 lbs. the beam failed by the tearing apart of the fibres upon the tension face.

Beam XII, with annual rings as in Fig. 17, was cut from the log 28 inches in diameter grown about 30 feet above the sea level about eight miles from Vancouver. Tree was felled in August and remained in salt water nine months, being alternately wet and dry, according to the tide. The timber was of good quality, straight grained, with several knots of medium size and a few season cracks; beam contained the heart of the tree. Under a load of 49,000 lbs. the beam failed by shearing logitudinally along the season crack A B.

Beam XIII—History same as that of beam IX., with annual rings as Fig. 18. Timber of good quality, several small cracks along the back of the beam, and small season cracks along the whole of the front about three inches above the face in compression. At 29,300 lbs. the beam failed by the crippling of the fibres on the compression face, commencing at a small knot at the back (Fig. 19).

Beam XIV is in reality beam XIII re-tested. The beam was replaced in the machine with the crippled side reverse, so as to be in tension. At 17,600 lbs. it failed on the tension side by the tearing apart of the fibres along the surface at which the crippling took place on the previous test.

Beam XV, with annual rings as in Fig. 20, was timber of first quality, clear and straight grained, and free from knots, its history being same as that of beam XII. At 37,000 lbs. it failed by the crippling of the fibres on the compression face, Fig. 21.

Beam XVI is beam 15 re-tested. The beam being reversed, it failed under a load of 25,580 lbs. at the point at which the crippling had previously taken place. A load of 32,000 lbs. was then applied, when the beam fractured a second time on the tension side.

Beams XVII to XXI were sent to the laboratory by the British Columbia Mills, Timber & Trading Company, and were cut on the coast section of British Columbia.

Beam XVII was coarse grained, contained a number of small knots on the compression side, was cut from the heart of the tree, with annual rings as in Fig. 22. At 48,600 lbs. it failed by the tearing apart of the fibres on the tension face, which was followed immediately by a longitudinal shear coincident with the neutral plane at the centre of the beam and extending for a distance of eight feet from the end, Fig. 25.

Beam XVIII was cross grained, contained several knots, was cut from the heart of the tree, and showed annual rings as in Fig. 26. At 69,400 lbs. the beam failed by shearing longitudinally, the shear being immediately followed by the tearing apart of the fibres on the tension face, Fig. 27, 28, 29.

Beam XIX was of exceptionally good quality, with clear, close grain, no knots, and annual rings nearly vertical, as in Fig. 30. At 59,540 lbs. it failed by longitudinal shearing, followed by the splinting of the upper edges on the tension side, Fig. 31, 32.

Beam XX was cut from the heart of the tree, with annual rings as in Fig. 33, was coarse grained and contained a number of knots. At 40,000 lbs. it failed by the crippling of the fibres on the compression side in the neighborhood of a small knot 1¼ inches above the compression face, Fig. 34, 35, 36. The load was gradually increased to 49,600 lbs., when the beam again failed by tearing apart of the fibres and tension face.

Beam XXI—Annual rings as in Fig. 37. At 17,960 lbs. a sharp fracture took place by the tearing apart of the fibres on the tension side, accompanied by a simultaneous crippling of the fibres upon the compression side, Fig. 38, 39, 40.

OLD DOUGLAS FIR.

Beams XXII-XXV were four old stringerstaken from trestles. Beam XXII had been in position for nine years, in a dry country, with very little rain fall, and

subject to a hot sun in summer. The annual rings were as shown in Fig. 41. At 55,400 lbs. the beam failed by a longitudinal shear, as in Fig. 42 and 43.

Beam XXIII was taken from a trestle near Port Moody, and had been in position for a period of six and one-half years in a place subject to the heaviest rainfall in the province. Annual rings as in Fig. 44. At 47,560 lbs. the beam failed by the tearing apart of the fibres of the tension face, which was immediately followed by a longitudinal shear, as in Fig. 45 and 46.

Beam XXIV was cut from a log grown on a bench near Spuzzum, about 500 feet above the sea level, and had been in position eleven years in a district with a climate similar to that of Nova Scotia. Annual rings were as shown in Fig. 47, and the beam contained several knots and season cracks. At 41,000 lbs. material at one end of the beam was crushed in. The ends, partially decayed, were sawn off and the load increased to 76,900 lbs., when the beam failed by longitudinal shear.

Beam XXV had been in service on Kamloops Lake for a period of eight years. The annual rings were as in Fig. 50, with heart showing on one of the faces. At 42,900 lbs. a large splinter broke off on the tension face and the beam failed by longitudinal shear, as in Fig. 51 and 52.

The following table gives a summary of the results obtained:

Beam.	Dimensions in inches.	Weight in lbs. per cubic foot at date of test.	Maximum skin stress in lbs. per sq. in.	Co-efficient of elasticity in lbs.
NEW TIMBER, SPECIALLY SELECTED.				
	l d b			
III.	66 x 5.375 x 4.125		10,441	2,178,100
XIX.	138 x 12.1 x 9.1	41.22	9,043	1,934,500
VII.	69 x 6 x 5.8125	39.92	8,712	2,044,115
XV.	198 x 15 x 6.125	38.92	8,020	1,989,400
NEW TIMBER, FIRST QUALITY.				
	l d b			
X.	198 x 14.875 x 6	37.80	4,027	1,629,616
XI.	204 x 14.875 x 8.6875	36.99	5,698	1,770,563
IX.	204 x 14.875 x 9	35.76	7,694	1,764,939
VIII.	69 x 5.125 x 5.5	35.74	8,382	1,584,692
XVIII.	138 x 17.8 x 8.76	35.59	5,196	1,329,900
XVII.	138 x 15.125 x 9	35.17	4,907	1,259,600
XX.	138 x 12 x 8.88	34.92	6,559	1,571,150
XII.	204 x 14.875 x 8.8125	34.79	7,645	1,678,300
XIII.	204 x 14.75 x 6.6	34.13	6,912	1,643,193
XXI.	138 x 8.98 x 5.95	30.83	7,784	1,588,400
VI.	69 x 6.125 x 6	30.23	7,116	1,489,215
I.	96 x 12.125 x 9		4,897	1,138,900
II.	66 x 12.125 x 5.625		4,378	1,146,900
V.	69 x 9.125 x 5	29.18	5,869	946,270
IV.	69 x 9.125 x 5	28.27	4,156	926,500
OLD TIMBER.				
	l d b			
XXIII.	186 x 14.35 x 8.78	38.59	7,339	1,878,950
XXII.	162 x 15.6875 x 7.75	33.75	7,086	1,665,560
XXV.	144 x 15.65 x 8.2	33.11	4,613	949,720
XXIV.	132 x 16.2 x 7.75	32.8	6,135	1,201,620

VALUABLE ARCHITECTURAL BOOKS.

The Maharajah, of Jeypore, India, has presented to the Toronto Public Library ten beautifully illustrated volumes descriptive of the architecture of the temple and ancient buildings of India. They form valuable works of reference for students of architecture.

ILLUSTRATIONS.

NEW MUNICIPAL BUILDINGS TORONTO.—E. J. LENNOX, ARCHITECT.

RESIDENCE, WALMER ROAD, TORONTO, FOR MR. JOHN M'KEE.—F. H. HERBERT, ARCHITECT.

SKETCH ELEVATION WITH PLANS FOR BRITISH COLONIAL PAVILIONS AT THE PARIS EXHIBITION OF 1900.

THE WEILER BLOCK, VICTORIA, B. C.—THOS. C. SORBY, ARCHITECT.

The premises occupy the whole area between Government and Gordon streets, with a side frontage on Broughton. The basement floor is lofty, well drained and dry, and will be perfectly lighted by the Luxfer Prism Co., of Toronto, the first introduction of these lights into the province. This storey will be used for floor cloths and other similar heavy goods and covers an area of about 12,000 superficial feet. The ground floor will be used for crockery, etc., and here will be placed the offices of the firm. Two spacious entrances give public access from Government street and Broughton street, and two more are provided for the entrance and delivery of goods in Gordon street. This floor covers an area of about 8,000 superficial feet and is 17 feet high, lighted by immense plate glass show windows, the largest in the province.

A first-class Otis electric passenger elevator provides rapid and easy communication with the basement and the upper four floors. The elevator well is closed in with handsome metal grille work and is surrounded by a broad easy staircase. An electric freight elevator also communicates with each floor. This elevator was erected by the Fensom Elevator Works, of Toronto, who also fitted up the contiguous new post-office building. The six floors provide a floor area of about sixty thousand feet.

The building is lighted throughout with electricity, with Frinck's most recent introductions for show window illumination.

The premises are heated throughout with steam generated in water tube boilers.

The building is of mill construction, massive posts, beams and joists of fir, and extra thick double flooring being employed. The walls are also massive in construction. Selected local brick is used in the front. The stone is from Saturna Island, the piers being built of very large, heavy stones with thick beds of lead between. The arched window openings in the Broughton and Government street fronts are of unusual size and boldness, and are filled in with large sheets of plate glass in ornamental window frames of oak. The roof is covered with extra thick steel plates.

The contractor for the brick and stone work is Mr. W. J. Smith; for the carpenter work Mr. F. J. Sherbourne, and for the roof and galvanized iron work, Mr. H. Cooley, who have each done most excellent and creditable work. The joiner's work and finishings were done by Messrs. Weiler at their own factory. The electrical work was executed by Messrs. G. C. Hinton & Co. Mr. Bryden discharged the duties of superintendent of works. The architect is Mr. Thos. C. Sorby, under whose personal supervision the whole of the work was carried out. The cost of the building was about $60,000.

A ladder or scaffolding is no stronger than its weakest part; hence the discovery of a weak part should be immediately followed by an absolutely thorough repair.

CORRESPONDENCE.

CAN CONCRETE BE MADE ACID PROOF?

To the Editor of the CANADIAN ARCHITECT AND BUILDER:

SIR,—I beg to inform you that concrete is not acid proof, as stated in an editorial in your August issue. I have an example right here in my office. I placed a piece of concrete in a glass jar and poured in enough nitric acid to cover the concrete. In a short time the lump of concrete had turned into a soft slush about the consistency of mud.

N. T. GAGNON.

Montreal, Sept. 28th, 1899.

[The article referred to, is simply a quotation from "Specification" and is so stated. The article does not claim that ordinary "concrete" is "acid-proof," but that it "can be made acid-proof." "Specification" is an eminent English authority. — Editor C. A. & B.]

TECHNOLOGY AND INDUSTRIAL ART.

OTTAWA, September 24th, 1899

To the Editor of the CANADIAN ARCHITECT AND BUILDER:

SIR,—The letter to "A Manufacturer," which was published in your September number, containing my opinion of our Ontario Art Schools, has caused much indignation amongst other Art School teachers and officers, and I do not wonder at it, but shall be glad if you will let me make a little explanation to them through your journal.

This condemnation of the Schools has nothing whatever to do with the individuals at work in them; it is as impersonal as was Galileo's objection to the theory that the earth was stationary. During this year I have met many Art School officials and teachers, and know they are just as earnest workers as I am, but we see something different from that which they are seeing, and although we may stand alone for a while in the effort to prove whether or not we see rightly, we are content to do so. If we are wrong we shall simply fail to accomplish any good work and our ideas will reach their proper place—oblivion.

One other point; although I have not visited every school, I included all in that condemnation. The reason for this seeming inconsistency is this: We were advised to apply for the government grant to Art Schools. We read in the book sent us from the Department of Education, the Act of Parliament covering this field of work; nothing detailed was there in regard to subjects or methods of instruction, and thinking our school entitled to the grant, we made application for it. The reply sent us indicated, however, that our school-work must include the list of subjects covered by the departmental examinations. Although we are for other reasons not entitled to this grant, this part of its requirements we could not agree to at any time; this deflection debars us from it permanently; and we see that all schools which obtain it must follow a course of study demanded by these examinations, and therefore must contain that weakness which in your August number, Mr. T. S. Brown, says, leads to the stultification of skill and the recording "to future generations our utter sterility of imagination if not our want of common sense."

Again let us say, we do not blame those who arrange these examinations; they think them right, but we wish to work in a different way and the paper entitled "Metal Work," page 156, is (for us) most opportune, because a re-reading of it by those who have been shocked perhaps by my first letter, will give them some knowledge of our ideals, when we say that our deviation from the prevalent system is caused by our desire to apply to daily, hourly study, the principles so clearly stated by Mr. Brown.

In the meantime we are content to have our work stand the test contained in another statement of your August number. "In course of time the presence of the acknowledged good will drive out the bad." This same frame of mind makes us consider that the whole question of Industrial Art and Applied Design education is not so difficult of solution as many suppose.

Canadians can do anything they want to do, even if it be to work out the best industrial system in the world.

Respectfully yours,

MARION LIVING.

To the Editor of the CANADIAN ARCHITECT AND BUILDER:

SIR,—Following up my remarks of last month touching on "Schools of Industrial Art and Applied Design," another system of schools also suggests itself to me as of such importance that I trust you will pardon me for again trespassing on your time if I go a little into consideration of them.

I refer to Trade Schools, with the following for their objects: To teach a boy or girl a trade; to teach them in what class by physique, age and conditions they are most likely to be a success; to teach them the importance of knowing the importance of understanding the fundamental principles necessary to success—preciseness in execution, obedience, sincerity and integrity.

For the girls, sewing and cooking should have first position which could be supplemented by other trades to which female ability is best adapted, such as stenography, telegraphy, typewriting, etc.

For the boys, carpentry, plumbing, tinsmithing, sign painting, machine shop practice, cabinet making, upholstering, and in addition a fair department for the advancement of agriculture.

In these times when the greatest benefit to our country is the development of farms, would it not be fair to suppose if our youth were made better acquainted with what might be accomplished in the country, it would offer an occupation to many who now are only thinking of a situation in the city behind a counter, because they cannot afford to study for a profession? Botany is hardly deemed of any use to-day by most school children, except as an accomplishment to be classed with the use of the piano, singing, etc., and is not recognized as of untold value in a proper understanding of agriculture. Chemistry and physics are thought by boys and girls to belong mainly to drug stores and doctors, whereas their association with agriculture is all important.

It is within our recollection that when at school a particular study had our fancy; with one it was grammar, another geography, and so on. Would not a boy's future find a readier solution were he given a chance to elect what vocation he would follow, instead of being pitchforked into a job because he no longer could be kept at school, and after tramping the town and finding some one affirmatively answer the question "Do you want a boy?" finds himself as an apprentice in a machine shop when his instincts are for carpentry or probably the farm.

Could not this question be taken up by the school-boards, and having visited some of the trade schools, such as the Hirsch schools of New York, probably some of the monies now uselessly expended in the cramming system could be made to yield better and more lasting results.

Yours etc.,

"MANUFACTURER."

To the Editor of the CANADIAN ARCHITECT AND BUILDER:

SIR,—Allow me to applaud "Manufacturer's" letter, which appeared in your September issue, anent "Technology and Industrial Design." To all who are interested in the higher development of industrial art in Canada, it must be gratifying to hear that our government contemplates the establishment of schools for this important purpose. The founding of these schools, however, is one thing and their proper equipment and maintenance is another. It is to be hoped, before a definite plan is mapped out, that the question of equipment will be most thoroughly inquired into, and that only the best of the best will be sought after, because the result will be largely determined by the beginning. To this end a thorough inspection should be made of the leading English and Continental schools of industrial art, and instructors procured therefrom, or from other approved sources, to aid in establishing, on proper lines, this highly valuable branch of national education.

"Manufacturer" objects to the embryo school being termed "Technical," and suggests the more comprehensive name, "School of Industrial Art and Applied Design." I think such a name covers the ground more fully, as it not only embraces "technique," but includes therewith "application," and is altogether wider in its scope than the latter only. "What's in a name?" A great deal, I answer. I would go still further than "Manufacturer" by suggesting, "The Canadian School of Industrial Art and Applied Design," thus giving it direct national importance, so that whatever merit might ultimately accrue from its production, Canada would be recognized as its birthplace. But while there is much in a name, the possible achievements of such a school are of far greater importance, and that Canada is ripe for it is attested by the extensive importation of articles bearing the imprint of careful art training, thereby increasing the revenue of other countries at the expense of our own, for there is no reason possible to advance why we should not, under proper conditions, hold a high place in applied art work. Canada has long enough been regarded as a babe in arms, too young to venture out alone. She is now a vigorous child, full of pardonable ambition. Her blood, brains and energy simply require to be properly directed, and the result will, quite within a decade, prove to be a good national investment.

There is yearly, in Toronto alone, enough wealth expended on architectural monstrosities and meaningless objects of so-called art to make the city glisten with interest if the same were but invested in cultured design and craftmanship such as would eventually result from properly organized art training schools.

Our present art schools, in spite of the efforts of an occasional instructor and an odd piece of meritorious handicraft, are a mere apology for what our nation needs. The government cannot commence any too soon to provide in every leading centre of manufacture such aid as will tend to develop the talent which certainly awaits it. Every country under the sun possesses the germs of art and design and the inborn spirit to apply these gifts to useful purposes. That is God's universal gift to man, and it remains with man to develop it. Is it too much, therefore, to suppose that, under proper guidance, our sons and daughters may eventually aid in making our commercial art products things of beauty and joys forever?

In architectural design, construction in carving, decorating and furnishing, with their many profitable and alluring branches, there is rich food for our youth. Canada has reason to show right early that she is not only a land of lumber, grain and cheese, but one of science and art, which are so essential to the betterment of all communities.

"Manufacturer's" letter is along the right lines, and should tend to further the desired end.

Yours truly,

ROBERT MCCAUSLAND.

STUDENTS' DEPARTMENT.

THE MODERN PHASE OF ARCHITECTURE.*

BY MR. LOUIS H. SULLIVAN.

GENTLEMEN,—The Cleveland meeting of the architectural clubs of the country will mark, I believe, the auspicious opening of a new era in the growth of architectural thought. It should, in the nature of things, be of serious import to us of the present and active generation to know what the generation to follow thinks and feels. Its thoughts may be immature, its feelings vague and formless; yet, nevertheless, in them the future life of our art is surely working out its destiny and the sincerity of them is not to be denied.

Youth is the most ambitious, the most beautiful, but the most helpless stage of life. It has that immediate and charming idealism which leads in the end towards greatness, but it can know little of the sorrow and bitterness of the struggle for greatness.

Youth is ineffable. I have said good-bye to mine; with solicitude I welcome yours. Perceiving as I do the momentous sway and drift of modern life, knowing as I do that the curtain has risen on a drama the most intense and passionate in all history, I urge that you cast away as worthless the shop worn and empirical notion that an architect is an artist (whatever that funny word may mean) and accept my assurance that he is and imperatively shall be a poet, and an interpreter of the national life of his time.

Do you realize how despicable is a man who betrays a trust? Do you know, or can you foresee or instinctively judge, how acutely delicate will become in your time the element of confidence and dependence between man and man and between society and the individual?

If you realize this you will realize at once and forever that, by birth and through the beneficence of the form of government under which you live, you are called upon, not to betray, but to express the life of your day and generation; that society will have just cause to hold you to account for your use of the liberty that it has given to you and the confidence it has reposed in you.

You will realize in due time, as your lives develop and expand and become richer in experience, that a fraudulent and surreptitious use of historical documents, however suavely presented, however cleverly plagiarized, however neatly replaced, however shrewdly intrigued, will constitute and will be held to be a betrayal of a trust.

You know well what I mean. You know in your own hearts that you are to be fakirs, or that you are to be honest men. It is futile to quibble, or to protest, or to plead ignorance or innocence, or to asseverate and urge the force of circumstances. Society is, in the main, honest—for why should it not be—and it will not ask and not expect you to be liars. It will give you every reasonable and every legitimate backing if you can prove to it, by your acts, that artistic pretension is not a synonym for moral irresponsibility.

If you take the pains truly to understand your country, your people, your day, your generation, the time, the place in which you live; if you seek to understand, absorb and sympathize with the life around you, you will be understood and sympathetically received in return, have no fear of this.

Society soon will have no use for people who will have no use for it. The clairvoyance of the age is steadily unfolding, and it will result therefrom, that the greatest poet shall be he who shall grasp and deify the commonplaces of our life—those simple, normal feelings which the people of his day will be helpless, otherwise, to express—and here you have the key with which, individually, you may unlock in time the portal of your art.

I truly believe that your coming together will result in serious things. You have my sympathy. I am with you in spirit, for in you resides the only hope, the only sign of dawn that I can see, making for a day that shall regenerate an art that should be, may be, and must be the noblest, the most intimate, the most expressive, the most eloquent of all. Your youth is your most precious heritage from the past. I am with you.

* An address delivered at the National Convention of Architectural Clubs, Cleveland, Ohio.

EARLY ENGLISH CHARACTERISTICS.

ARCHES pointed, generally lancet, often richly moulded. Triforium arches and arcades open with trefoiled heads. Piers slender, composed of a central circular shaft, surrounded by several smaller ones almost or quite detached generally with horizontal bands. In small buildings the plain multangular and circular pier is used. Capitals concave in outline, moulded or carved with representations of conventional foliage, delicately executed and arranged vertically. The abacus always undercut. Detached shafts often of Purbeck marble. Base, a deep hollow between two rounds. Windows at first long, narrow and deeply splayed internally, the glass being within a few inches of the face of the wall; later in the style, less acute, divided by mullions, enriched with foliated circles in the head, often of three or more lights, the centre light being carried highest. Doorways often deeply recessed and enriched with slender shafts and elaborate mouldings. Shafts detached. Buttresses projection about equal to breadth, with but one set-off or without any. Buttresses at angles always in pairs. Fonts of various shapes, often ornamented with foliage in high relief or the tooth ornament, the stem surrounded by detached shafts. Mouldings bold and deeply undercut, consisting chiefly of pointed and filleted bowtells or rounds separated by deep hollows. Great depth of moulded surfaces generally arranged in rectangular planes. Hollows of irregular curves and sometimes filled with the tooth ornament or foliage. Roofs of high pitch, collar beamed, timbers plain and open. Early in the style, finials plain bunches of leaves; towards the close, beautifully carved finials and crockets were introduced. Carved foliage of conventional character. Flat surfaces often richly diapered. Spires broached.—The Architect.

LAND MEASURE.

The square foot contains 144 square inches.

Yard = 9 feet = 1,296 inches.

Rod pole or perch = 30¼ yards = 272¼ feet.

Chain = 16 rods = 484 yards = 4,356 feet.

Rood = 40 rods = 1,210 yards = 10,890 feet.

Acre = 4 roods = 160 rods = 4,840 yards.

Mile = 640 acres = 2,560 roods = 6,400 chains = 102,400 rods, poles or perches.

An acre roughly stated has four equal sides of 69½ yards, accurate measurement gives each side 208.71 feet.

The sides of a square half-acre would be 147.581 feet, and for a square quarter-acre, 104.355.

THE BUILDER

[THIS DEPARTMENT IS DESIGNED TO FURNISH INFORMATION SUITED TO THE REQUIREMENTS OF THE BUILDING TRADES. READERS ARE INVITED TO ASSIST IN MAKING IT AS HELPFUL AS POSSIBLE BY CONTRIBUTING OF THEIR EXPERIENCE, AND BY ASKING FOR PARTICULAR INFORMATION WHICH THEY MAY AT ANY TIME REQUIRE.]

Half Trussed Roof.

An excellent method of trussing and tieing a roof of moderate span, is shown in the accompanying diagram (Fig. 1). It is supposed that an attic, which may be made avoidable if desired, is provided above the regular upper storey; therefore the walls are carried a foot or more above the ceiling joists as shown in the diagram. On top of the wall, resting on band timbers, is placed a scantling, 2 x 6 inches—or of other suitable dimensions—on edge, with one end projecting over the building and forming a "lookout" onto which the soffit or planceer of the cornice may be nailed. The outer end of the "lookout" is cut off plumb, to the right length from the face of the wall. The inside end runs into the building far enough so that the end of it can be spiked to the stud as shown. These studs should form part of the side of the wall and should be well spiked to the ceiling joists and set plumb before the "lookout" is nailed to it. After the studs, "lookouts" and joists are nailed together, the rafters may then be raised in place and spiked fast to the "lookouts" and to the

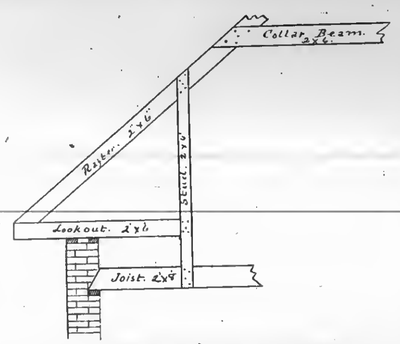


FIG. 1.—METHOD OF TRUEING A ROOF.

studs, after which the collar beams may be nailed to to the rafters, care being taken that they are placed to the right height to insure a sufficient space between them and ceiling joists to make a good room or rooms. The diagram is, to a great extent, self-explanatory, and is drawn to scale. The studding may be placed any distance from the wall, and if the building is of extensive span, the studding may also be attached to the collar beam as well as to the rafters. A roof built in this manner, if the work is well done, is very strong and is not likely to be affected by the winds or by any ordinary snow storm. If the roof is to be framed of heavy timbers, the same principles of construction may be adhered to, two joists being employed at the foot of the studs or struts, instead of one. The joists should be placed one on each side of the strut, and one or two bolts should pass through the joists and struts and the whole three pieces drawn tightly together.

Roof Gutters and Leaders.

Among the petty annoyances connected with buildings, is the freezing and bursting of gutters and conductor pipes in cold weather; or more properly speaking, the freezing of the slush which collects in them and which upon thawing cracks and bursts both of these fixtures. Scientists tell us that water is the one element which expands when congealing, and probably the initial injury is done at the moment of freezing, and is probably aggravated when the expansion and disturbance due to melting takes place. Formerly gutters were made of wood, and the leaders were attached to them in a very crude manner, and continual leaks and delay were chronic; the water was either discharged on the sidewalk or on the ground, thus undermining and destroying the foundations. Modern practice has substituted metal for wood in gutters, and corrugated and square pipes for leaders instead of the circular ones; and the conductor pipes are now connected with the soil pipes and thus affords an easy outlet for roof-water, besides being a convenient and safe ventilator for the sewer system. There are three methods of roof drainage ordinarily adopted: First, the metal gutter and leader, second, the parapet wall and box leader, third, the soil pipe roof leader. Each of these methods have their advantages and their failings. Let us deal with the first method: Flat roofs, of tin, or galvanized iron, generally have a metal gutter at their lowest end. This gutter is secured to the roof timbers by strips of iron, and soldered with a close joint to the tinning. At one end it is pierced by the leader, and the grade of the gutter is towards the leader; this leader should, and generally does, connect with the soil pipe and becomes the conduit for conveying the water into the sewerage system. This does very well during the mild seasons, but in a climate as uncertain and as variable as ours, the system speedily becomes unserviceable, defective and troublesome, often being the cause of great internal damage to a building. The trouble arises in this way: At certain seasons the melting snow is arrested in the gutter by a sudden change of temperature which reduces it to a viscid consistency, usually denominated "slush." As this hardens into ice, the gutter and leader become choked and obstructed. The expansion of the ice, and contraction of the metal will combine to warp, and finally rupture the joint between the roof tinning and the gutter, and the weight of ice firmly congealed in the gutter will have a tendency to break it away from its moorings under the tinning. Thus, a large gap is often made through which the water finds

its way into the building. This system is less objectionable in a southern exposure, and it may be made perfect if a steam pipe, through which exhaust steam escapes, be run along-side the gutter to keep it warm. The second method of meeting the roof-water difficulty is to carry the rear wall a foot or two above the roof timbers and cope it the same as the side walls. Form a valley against this wall to act as a gutter, which will lead the roof-water to a sluiceway or opening in the parapet wall, in which is firmly secured a spacious box-head attached to the leader, the opening in the wall being protected by lattice guards to prevent the washing down of cakes of ice. This method dispenses entirely with the metal gutter, although it still adheres to the metal leader. This system also requires a tight system of flashings in the brickwork near the valley in order to prevent the water from soaking into the walls. The third method of conveying the water from the roof differs but little from the second. By this method, the soil pipe, which is inside the house, is made the leader, and the water is carried directly from the roof to the sewer, without being exposed to the outside temperature, and is therefore not likely to freeze. The warmth ascending the soil pipe in an occupied building, is generally sufficient to keep the mouth of the pipe from freezing, and when a suitable cage or trap is placed over the orifice of the pipe, no ice will be able to enter it and thereby reduce the temperature. We have seen this plan put into practice with very satisfactory results. The apprehension of any possible freezing of the water in this soil pipe is a perfectly idle one, because the pipe is too far removed from the action of the frost, and the gases of decomposition within the pipe generate heat enough to keep the temperature of the pipe considerably above freezing through its whole line to within a foot or two of the roof. Roofs drained in this way are subject to fewer accidents, and the tinning as well as the rear brick wall are exempted from the trying effects of a cracked gutter and a bursted leader.

Retaining Walls.

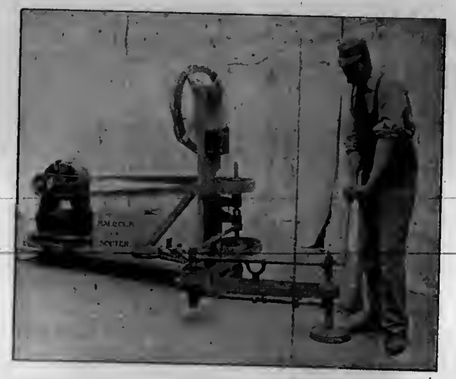
It is not often the Canadian bricklayer is called upon to build retaining walls, but, sometimes there are occasions on which his services will be required for this purpose; and it is as well for him to be armed with the required knowledge in order to properly execute the work when called upon to perform it. Earth, when thrown into a heap assumes a conical shape, the slope or slant of the sides—ordinarily—forming an angle with the horizon of 45 degrees; which inclination may be taken as a mean slope into which earths newly thrown up will arrange themselves; and from this fact, it may be gathered that a very strong wall will not be required to retain earth in position where the slope of the bank is only 45 degrees or less steep. When the earth is replaced behind the wall it should be firmly tramped down and made to hug the wall closely, as the wall is carried up, that in settlement it may not leave hollows behind the brickwork. The wall should be built on a solid concrete foundation and be furnished with ample footings in good set-offs, and be battered towards the bank which it is built to keep in position in proportion to the height to which it is intended to rise. It may be stepped or diminished in thickness as it ascends. If the bank is very steep and the pressure against the wall likely to be great, the wall may be strengthened by the addition of buttresses placed at intervals, and built in with the wall as the work progresses. There should be left in the wall at frequent intervals "weep-holes" to allow the ingress of air and escape of moisture from behind the wall. These "weep-holes" may be formed by leaving out headers in the brickwork or by building in common drain tiles of small bore, and letting their outward ends project somewhat over the face of the wall. This latter method is preferable, as then any drainage that may flow will be carried to the outside, where if only headers are left out, a portion of the water will soak into the lower brick and eventually damage the wall. In the construction of buttresses, or "counterforts" as they are called in England, the wall should be well bonded into them, and the top of the buttresses should be sloped off along with the wall and finished, or coped off, with stone or Portland cement. All bricks used in the building of retaining walls, should be hard and well-burned. Soft or clayey bricks should never be used near earth contact, or when exposed to the weather.

THE HAMILTON BUILDERS' EXCHANGE.

We are advised by the secretary of the Hamilton Builders' Exchange that there is no foundation for the statement made in a paragraph recently published in the daily papers that it had been decided to close up the organization. The secretary suggests that the statement was probably the outcome of the fact that no meetings were held during the summer months.

MACHINE FOR POLISHING PARQUETRY FLOORING.

Herewith is illustrated a machine for polishing parquetry flooring, designed by Messrs. Malcolm & Souter, of Hamilton, Ont., and which was used to good advantage on about 20,000



MACHINE FOR POLISHING PARQUETRY FLOORING.

feet of parquetry flooring laid in the new Royal Hotel in that city. Being unable to obtain men to plane and scrape such a large quantity of flooring, Messrs. Malcolm & Souter overcame the difficulty by inventing this machine. They found that the work was done better than by hand, as no plane or scraper marks were left. The machine is a regular disc sander erected on a platform and driven by an electric motor. The platform is on four wheels covered with rubber; the two under the motor are on a centre with handle attached for moving about, and the two under the machine are parallel with the platform and keep the machine steady. The motor is two horse power. The only objection met with was the dust, and this was overcome by hanging cotton sheets on all the openings. This machine can only be used profitably on large contracts, but should they have occasion to use it again, the inventors state that they would attach a small fan on one end of the motor and connect it with the disc, and blow all the dust out with a flexible exhaust pipe of canvas. The machine polished about 36 square feet per hour.

THE VANCOUVER BUILDERS' EXCHANGE.

We have the privilege of presenting herewith the portrait of Mr. C. P. Shindler, who has been elected vice-president of the Vancouver Builders' Exchange, vice Mr. Mitchell, resigned—also brief personal sketches of the other officers, whose portraits appeared in our August issue.

MR. EDWARD COOK.

President the Vancouver Builders' Exchange, was born at St. Mary's, Ontario, 1853. After having received a commercial education he served an apprenticeship as stone cutter, mason and bricklayer. He was afterwards two years under instructions in engineering bridge and building construction in connection with N. Y. state works at Buffalo, and the International bridge. Returning to Canada he carried on a general contracting business under the firm name of Cook Bros. for ten years, in the towns and country between St. Marys, Sarnia and Goderich. He followed the tide westward when the contract was let for the building of the Canadian Pacific Railway—arriving in Winnipeg in '79—and at Vancouver in March, 1886. Since that time he has been identified with the upbuilding of Vancouver, and is one of the city's leading contractors, and has confirmed his confidence in the city's future by investing in central business property. He is a strong advocate of the best methods and principles in the conduct of business, and conjointly with the board of directors and members of the Builders' Exchange, is doing much to improve business relations in the building trade, as it affects the owner, the architect, the material supply dealers, employees and contractors.

MR. C. P. SHINDLER.

Mr. C. P. Shindler, vice-president, was born in Germany 35 years ago and crossed to this continent in 1880, since which time he has been constantly in the

MR. C. P. SHINDLER.

building business. He received his early training with the firm of Kuppler & Keifer, of South Bend, Ind. With this firm he succeeded in making himself so useful that in 1886 he was admitted as a partner. Two years afterwards he withdrew and went into the contracting business on his own account, gaining a wide experience by working for ten years in the states of Indiana, Florida, Oregon and Washington.

In 1890 Mr. Shindler came to Vancouver, and except a few vacations spent in his native land, he has since been constantly engaged in building up that city. The Hudson Bay building and the De Beck block are two of the many structures, large and small, that he has erected.

Mr. Shindler is known as an all round man in the business, and his wide experience renders him a very capable member of the Exchange.

MR. A. E. CARTER.

Mr. A. E. Carter, Secretary, is a builder by birth and association, being the son of the late John Carter, builder and brick manufacturer of St. Catharines, Ont. He was educated in the St. Catharines Institute, then served an apprenticeship with his father. Before reaching his majority he left home and widened his knowledge and experience in the trade, by working as a journeyman stone-cutter and bricklayer in New York, Pennsylvania, Florida and other States. Returning to Canada, he first went into business as a contracting builder at Niagara Falls, the brick and stone memorial church on the historic Lundy's Lane battlefield, being one of the marks he has left in this locality.

In March, 1889, Mr. Carter decided to take Horace Greely's advice and came west to Vancouver, where he was soon afterwards joined by his brother, the late S. B. Carter. Together they carried on an extensive business as building contractors, replacing with substantial brick and stone structures, the giant stumps which were so conspicuous until recently on even the main thoroughfares of the city. Since his brothers' unfortunate death, which was caused by a fall from a building in December, 1897, Mr. Carter has been alone, and is one of the busiest men in the busy city of his adoption.

MR. H. A. BELL.

Mr. H. A. Bell, Treasurer, is a well known builder and contractor of Vancouver. He was born in Northumberland, Ontario, served his apprenticeship as carpenter at Belleville, and then entered the employ of Messrs. Shaunbergers of Pittsburgh, Pa., for eight years. After successfully carrying on contracting at Winnipeg for five years, he removed to Victoria in 1885, and commenced business as builder and contractor in Vancouver in the fall of the same year. Many of the prominent buildings have been erected under his management. He has also been entrusted with important contracts in British Columbia for the Dominion and Provincial Governments.

Mr. Bell has suceeded well in his undertakings, is the owner of considerable real estate in Winnipeg and Vancouver, and in a general way deserves credit for energy and ability. He is much respected as a citizen and known as a man that will carry out his undertakings.

The organization of the Builders' Exchange has resulted in bringing into pleasant acquaintanceship, the leading contractors of Vancouver, many of whom were previously strangers to one another, notwithstanding that some had been in business in the city for ten years and upwards.

The principal business which at present engages the attention of the Exchange is the preparation of a code of rules to govern the relations between the architect and contractor.

Business in Vancouver is reported to be as brisk as ever, but it has been somewhat retarded by the difficulty of obtaining stone-cutters. There are plenty of men in other trades.

LOW PRESSURE HOT WATER AS A HEATING MEDIUM.*

LOUIS F. PEARSON.

In comparing low pressure hot water with other forms of heating apparatus, let us first consider what are the vital and most necessary qualifications of a heating installation.

First—I think above all things it should be efficient, that is, capable of maintaining a natural and equitable temperature.

Second—It should be neat, and not occupy too much space.

Third—It should not give off any smell or products of combustion into the building to be warmed.

Fourth—It should not be liable to reach a temperature that is likely to burn either children or the feeble-minded who may happen to fall upon it, or be the cause of setting the building on fire.

Fifth—It must be cheaply constructed if it is to command a large sale, which we all look for but do not always realize.

Sixth—It must be fitted in such a manner that it can be attended to by the latter class of individuals mentioned in paragraph 4, as unfortunately the person chosen to attend to the heating apparatus, in both public and private buildings, seems generally to be selected because he is fit for no other purpose.

Seventh—It should, if possible, assist ventilation.

Eighth—It should be easily controlled.

Now, taking the first of these necessary qualifications, I think it will be generally conceded that a low pressure hot water apparatus, when properly fixed, gives a more natural, equitable temperature than any other form of heating medium, for I think that those who have had their offices heated with either steam or high pressure would give them a very secondary position; while under this head I consider any form of hot-air stove can scarcely be entered for competition.

Looking to the second qualification, we do not find low pressure hot water takes such a good position, as undoubtedly both steam and high pressure water are neater in appearance and take up less space; though since the introduction of radiators, where they are carefully fixed with the mains under the floor, the unsightliness of the low pressure apparatus has been greatly changed for the better, as undoubtedly the old-fashioned 4 in. pipe coils were both unsightly and occupied far too much space.

When we come to the third qualification, I think low pressure is still to the front, for though we know that if steam and high pressure pipes are kept perfectly clean the smell from them is very slight, yet how often are they kept clean? And there is no doubt that if the pipes are not kept free from dust, the hotter they become the worse they smell. I think the hot air stove is also the worst offender in this respect, for the difficulty of cleaning the flues thoroughly, and of keeping the stove itself from cracking, makes it extremely difficult to have this form of apparatus working any length of time without either an unpleasant smell or sulphur fumes being introduced into the building.

My fourth qualification is that the apparatus shall not be hot enough to burn either the inmates or the building itself. Now, here again I must place the low pressure first, steam second, high pressure third, and stoves last, and by far the worst; for though they are generally placed in the basement out of the reach of children, there is no doubt in America, where they are largely used as a cheap form of heating, they cause more fires than anything else; and though no doubt, as Mr. Ginrod has told us, high pressure apparatuses, when fixed by a competent firm, are innocent of this charge, yet there is no denying the fact that many fires have been caused by the high pressure system, and both these and steam pipes are not pleasant to fall against, and when protected by grids we get back to another form of the coil case with all its disadvantages.

Number six qualification is a very difficult one to arrive at, and I am sure there are many of our members who have often been annoyed by being sent for to an apparatus that was left working satisfactorily a few months previously, and told that "they could not get any heat." My opinion is that we can again put low pressure hot water first, as being the most difficult apparatus to put out of order; for a steam boiler is certainly not so easily attended to, and though low pressure steam boilers have been immensely improved and simplified during the past few years, yet they are still far more complicated than hot water; and though high pressure is very simple in its working, still it requires periodically overhauling and refilling by a competent man, which in country places is both expensive and inconvenient.

Number seven qualification is another difficult problem that a heating engineer is confronted with, viz., how to both heat and ventilate buildings successfully with one and the same apparatus. For this purpose low pressure steam has been very largely and successfully used for both indirect and direct-indirect radiators and coils, but personally I think that all forms of indirect heating have one very weak point, that is the difficulty of cleaning them.

Take, for instance, the American pin radiators; they always appear to me more as if they had been constructed to catch fluff and dust than to be readily cleaned. Of course, the "Plenum" system, when fitted up with glazed brick flues and water screens for washing the air, may be very successful, if—and here is the difficulty—these flues and screens can be kept perfectly clean. I think that ventilating radiators for small and medium-sized buildings form the cheapest and most efficient combined ventilating and heating apparatus, though, of course, unless very carefully fixed, these are liable to give trouble with dust and dirt blowing into the rooms through the radiators; and there is also the liability of them freezing in severe weather, when the inlet has been left open or the fire has been let out.

But this system has one great advantage, and that is, it can be readily cleaned, which, to my mind, covers a multitude of sins.

As to paragraph eight, I think there is no doubt that low pressure hot water is more easily regulated and controlled than any other form of apparatus. If steam radiators are fitted with two perfect valves, of course they cool quicker after they have been shut off than hot water (which is often a great advantage), but how often are valves perfect when they have been at work some years? We often hear American heating work very highly praised, and no doubt there are many fine installations in the States, but I can truthfully say that while I was there I scarcely ever found a steam radiator in the hotels that I could entirely shut off, and as the bedrooms are often over 80 degrees, I suffered great

*Condensed from a paper read at a meeting of the Institution of Heating and Ventilating Engineers, held at Stourbridge, England, July 18, 1899.

discomfort in consequence. I remember after passing a very uncomfortable night with the temperature of my room something nearer 100 than 60 degrees, I told one of the leading New York engineers that "I supposed that I was very old-fashioned, but I had yet to discover that steam was superior as a heating medium to hot water." His reply was, "You never will discover it in this world, and especially for the English climate."

He went on to tell me that there was more hot water work being done in the States than ever there had been, though, of course, with the winters being so severe, they have to put in a very large surface compared with what is necessary in England.

While comparing the two systems, I think the fact is well worthy of consideration that plant life thrives much better with hot water than with steam, as any good gardener will tell you. The Americans do use steam largely in their greenhouses, but they find that, to obtain good results, there must be very careful watering and vaporizing; and, where the plants have to be kept in the houses all the year, they are not so healthy as where the houses are heated with hot water.

MANUFACTURES AND MATERIALS

THE GEORGIAN BAY PORTLAND CEMENT COMPANY.

On the site of the old Polson ship-building works, alongside the harbor of Owen Sound, the Georgian Bay Portland Cement Company have erected and equipped extensive works. The company was organized at the commencement of the present year with a capital of $95,000. The officers are: President, Mr. M. Kennedy, of the firm of Wm. Kennedy & Sons, Owen Sound; vice-president, Mr. H. B. Harrison, Owen Sound; secretary-treasurer, Mr. J. W. Maitland, of the lumber firm of Maitland, Rixon & Co., Owen Sound. The additional directors are Messrs. Samuel Lloyd and A. G. Mackay. The manager is Mr. W. J. Budd, formerly of the Cassadaga Cement Works, New York.

The company have utilized only one of the buildings formerly occupied by the Polson Co., but have erected four new ones specially adapted to the requirements of the business. The group of buildings, as has been stated, is situated close beside the harbor, and the company have a private slip and dock at which vessels can deliver fuel or receive consignments of cement. The works are also connected by a spur with the Canadian Pacific and Grand Trunk railways.

The marl, which comprises 75 per cent. of the manufactured product, is obtained from Williams Lake, near Holland Centre, 14 miles distant. In order to drain this lake and obtain dry marl throughout the year, the company have dredged a channel 3 000 feet long, 20 feet wide and 9 feet deep. They have also constructed and own two miles of railway connecting the marl deposit with the Canadian Pacific Railway, over which the material is conveyed to the works. An analysis is said to have shown the marl to consist of 95 per cent. of pure carbonate of lime.

The company own three different deposits of clay, some of which is adapted to the manufacture of slow setting and some to quick setting cement. The bulk of the clay required will be brought across the head of the bay. At present it is being hauled in carts, but a less expensive method will be employed. The experiment will be tried of bringing it across on the ice during the winter, and should this not prove satisfactory, scows will be used.

The character of the clay combined with the marl from the Williams Lake deposit is shown in recent tests, which give 200 pounds in two days, 440 in four days, 525 in five days, 640 in six days, 675 in eighteen days, and 750 in thirty days.

The works consist of the main building (260 × 60 feet), the dryers building (140 × 100 feet), and the kiln building (78 × 70 feet and 65 feet high), in the centre of which are the four kilns, which stand 100 feet high. Besides these there are the office buildings and a number of outbuildings. The C.P.R. have laid down about 2,000 feet of sidings in the yards, while ample fire protection is supplied from the town system, the two hydrants being covered by hose houses in which the hose reels stand ready to attach. The water supply for mechanical purposes is drawn from the bay. Foundations are down for a large storehouse to the immediate north of the main building near the railway tracks, the capacity of which will be 40,000 pounds.

The marl, on arrival at the works, is shovelled into self-dumping trucks, hauled up to the second floor, and tripped into hoppers, the spouts from which run into the mixers on the floor below. On the second floor are also the bins holding the clay, which is also hauled up on trams, weighed, and fed into the mixer hoppers in proper proportions, both forming the paste which gives the process the name of "semi-wet." From the mixers the paste goes into a long iron trough, where it is thoroughly kneaded and passed on to the compressing machines, where all the moisture possible is squeezed out. The bricquettes are pressed and placed on steel shelves, which fit into steel trucks. Rails lead from the pressing room across to the big drying house, in which are located the dryers. Fourteen tracks 114 feet in length run through the chamber, which is heated to a high degree by an enormous furnace located at the south side. The drying rooms are thoroughly fire-proof, the floors and roofs being constructed of brick and iron. No smokestack runs up from this furnace, but smoke and heat are driven through various compartments into the section in which the briquette trucks are run, by two gigantic fans creating a draft which keeps the furnace at a white heat. After it has served its purpose, the hot air, made moist by the evaporation of the briquettes, passes out through ventilators in the roof. After the briquettes are passed along the tracks of the dryer, the truck loads are run along on a transfer track and up the elevator to the fourth floor of the kiln house, in which are located the bases of the four big Alborg kilns. The kilns are fired from the third floor, coal chutes for the purpose being placed all round the kiln, thereby securing uniform heat. Each of these kilns has a capacity of 75 barrels per 24 hours, and requires re-lining only once in eighteen months. The fuel used is Virginia slack coal, costing about $2.25 per ton, of which 9,000 tons per year will be consumed. The clinkers are drawn out on the ground floor, and thrown into pan conveyors, which carry them up to the grinding rooms, which are located in the centre of the main building, where are two ball mills of 300 barrels capacity and one tube mill of equal capacity. Here the briquettes are fed into hoppers and drop into the two enormous revolving grinders, in which the heavy steel balls crush them to coarse cement. This falls into a bin below, and is then carried by bucket elevators to the second floor again and fed into the finishing pulverizer, a huge cylinder in which have been placed barrels of flinty pebbles, which grind to the finest powder the cement as it revolves. From this machine the finished article is elevated and carried into the receiving room, afterwards being bagged or barrelled as the orders require. The process is most complete, a strong feature being the small amount of labor required for handling during the process of manufacture.

The works are operated by a 360 h.p. Brown compound horizontal engine, carrying an 18-feet fly-wheel and pulley, supplied with steam from a bank of three boilers. These boilers also furnish steam for heating the offices and works and for driving a 40 h.p. engine used to operate the blowers, the self-fueling machinery and fans for the furnaces, the dynamo which will supply the buildings with 125 incandescent lights, as well as an arc light in the yards. The boilers are fitted up with blowers operated by small independent engines, which will give a forced draft and for which a saving of fuel is claimed.

The works were put in operation for the first time last week, and are said to have started off without a hitch.

It is the intention of the company to send an exhibit of their product to the Paris Exhibition.

A letter was received by them recently from Lord Kitchener, making enquiry with regard to the capacity and cost of construction of kilns. The letter stated that the Sirdar contemplates the early construction of cement works in the far East.

The city of Winnipeg owns and operates a large quarry at Stoney Mountain, employment being given to about one hundred and fifty men. On an average twenty car loads of stone per day or 8,000 tons per month are shipped out from this quarry. The stone is employed in street making in Winnipeg, and for this purpose passes through a crusher at the quarry. The quarry has been excavated to a depth of 20 feet, and is equipped with railway tracks converging to a turntable in the centre, from which the stone is lifted into a chute and dumped into the crusher. An electric drill is also employed. The quantity of stone is said to be almost inexhaustible.

BUILDING MATERIALS OF TEXADA ISLAND, B. C.

In an article recently contributed to "Mines and Minerals," Mr. Alfred Raper describes the character of the deposits of stone, marble, slate and lime on the above named island as follows:

Texada Island is situated on the Gulf of Georgia, in about 50° north latitude, about 120 miles from Victoria, 50 miles from Nanaimo, about 75 miles from Vancouver, and 18 miles from the coke ovens of Union. The island has a population of about 400, a postoffice, and money order office; three wharves, and the government of British Columbia has, during the past year, completed a trunk road across the island from the west coast to the east coast. The island is about 33 miles in length, bearing south-east and north-west, and about five to seven miles wide. The waters of the Gulf are generally of great depth along the rocky shores of the island which is on the direct route to the great gold fields of Northern British Columbia and Alaska.

The general formations of the island are granites, porphyrites, and limestones. The granites are chiefly found on the east coast and from the finer textures of many of the outcrops may be classed as syenitic, though we occasionally find the biotile granites intruding through the limestones. The east coast, next to the main land at its southern extremity consists chiefly of porphyries along the coast line, but a short distance back from the shore is an extensive body of limestone near to the foothills of Mount Shepard, our highest mountain, which is about 3,000 feet high. One portion of this limestone deposit is epidotic in character; each red blotch in the rock has a white center giving it a "bird's-eye" maple appearance. Between this epidote marble and the blue-gray limestones, a narrow belt of shist occurs. Northerly, along the coast an outcrop of biotite granite appears, while the interior hills are porphyries and limes, amongst which deposits of magnetic iron ore occur. Going northerly towards Marshall Point is one continuous body of limestone, with a few minor intrusions of porphyries and it is in this particular part of the island that most progress has been made in mining.

Passing along the northern end of the island the Texada lime works are seen, where the celebrated "snow-flake lime" is made from the dark blue granite limestone which is so extensively distributed over this part of the island.

Passing westerly from the lime works at a short distance the limes give place to the dioritic porphyries varying from a fine-grained porphyrite to what is classed here by our miners as a "snow-flake porphyry." This is found usually a short distance back from the beach, assuming a remarkable block cleavage, with peculiar "stars of feldspar" over its surface. It is an orthoclase feldspathic rock, or felsite porphyry. It is in this rock that some of our richest specimens of free gold have been found; also some good deposits of copper and gold are being worked, with a very encouraging outlook. Over this lie the heavy deposits of lime before mentioned. About one and a half miles from the beach are found beds of the blue gray limestone lying between the porphyries. These limestone strata generally dip into the porphyries at a slight angle here and it is amongst those heavy lime deposits that the richest copper deposits, so far opened, are located.

Deposits of slate are said to exist in the center of the island. A remarkable thing is that no claim has yet been abandoned upon which a reasonable attempt has been made to prospect.

The major portion of the island is yet a "terra incognita" to prospectors. In the valleys of the center of the island some deposits of clam shells are found embedded in fine sands and gravels in a remarkable state of preservation. The writer collected sixteen varieties of the limes varying in color from white to black, one specimen of which, when polished, resembles hailstones. The greater portion of the limes are susceptible of very high polish. The Sturt Bay Company has during the past few weeks had a force of men building wharves and preparing the ground for excavating the marbles for sale, while the fine pieces and culls will be burnt in the new kilns into lime and sent to Vancouver and adjacent cities. In several places in conjunction with the limes a ferro-oxide occurs, assuming a spongy shape, the base of which is silica.

RECONSTRUCTED GRANITE.

The Street Railway Journal describes a new fireproof material. It is made of granite chips, pulverized, moulded into form and fused together at a temperature of 3,000 degrees Fahrenheit. It can be heated red hot and thrown into cold water without being injured. It resists the action of acids and alkalies and is frost-proof, having been tested by liquefied air at a temperature of 350 degrees below zero, without injury. Its crushing strength is very high. Two moulded forms are shown: One is the sectional insulator block used between the sections of the third rail system at Manhattan Beach; the other is used on the Brooklyn elevated railway. At Niagara Falls a test showed that it required 56,600 volts to penetrate about one-half inch of this material.

The Stanstead Granite Quarries Company was recently incorporated at Toronto, with a capital of $130,000, to operate granite quarries at Stanstead and Mount Johnson, Que. The following persons compose the directorate: W. R. Brock, president, Toronto; Hugh Elder, Stanstead Junction; Duncan McIntosh, Toronto; John McIntosh, vice-president, Toronto; John W. Elder, Stanstead Junction; D. Taylor McIntosh, managing director, Stanstead Junction.

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EXPERIMENTS ON THE STRENGTH OF GLASS.

THE extensive use of glass in construction renders definite information about its resistance under various conditions of stress desirable, but with the exception of the ultimate strength under direct compression, but little has been known about the subject until recently, says the Engineering Magazine.

A series of experiments upon the resistance of glass to tension and to flexure has recently been made by M. Grenet under the auspices of the Societe d'Encouragement pour l'Industrie Nationale, the details and results being published in the Bulletin of the society. The glass tested was of two varieties, manufactured by the well-known works at Saint-Gobain, one being the grade known as No. 4, and the other the so-called "cathedral glass," and there being but little difference between the two shown by chemical analysis.

In the flexure tests the specimen was placed as a beam, supported on knife edges and with the load applied in the middle, the weight being a bucket suspended from a cross bar and arranged so that water dropped regularly into it from a separate vessel. The load could thus be applied at a uniform rate without the possibility of shock, and the rate of application kept under perfect control. By applying the usual formula for rectangular beams loaded in the centre, the tensile strength per unit of cross section was determined.

The most interesting feature which was developed by these tests was the marked effect produced by variations in the rapidity with which the load was applied. It is well known that for nearly all materials a rapidly applied load will show an apparent resistance much greater than appears when the stress is applied more slowly, but in the case of these tests upon glass the effect is especially marked. Thus the tensile strength of a number of specimens averaged 6,000 to 7,000 pounds per square inch when the load was applied at a rate which caused the rupture to occur in 15 to 20 minutes, while when the duration of application was increased about three times, so that rupture occurred in about 45 minutes, the strength ranged between 5,000 and 6,000 pounds per square inch. When the water-dropping device was arranged for very slow loading, and the breaking load was attained in 10 to 12 hours, there was a marked diminution in strength, the resistance per square inch being only about 4,200 pounds.

In order to show the reverse effect, some tests were made with loads applied very rapidly, and the effect was most marked, the mean of three trials giving an apparent strength of 10,000 pounds per square inch.

A number of flexure tests were also made by M. Grenet upon glass rods, and these showed the same general results as regards the effect of rapidity of application of load. The actual strength of the rods, however, was higher than that of the plates, which was probably due to the difference in the method of manufacture. Thus, when the rupture was produced in about 15 minutes, the strength was nearly 11,000 pounds per square inch, while when the time was extended to 45 minutes the resistance fell to about 9,000 pounds, and for the 12-hour tests the breaking strength was but 5,700 pounds. In order to carry this feature of the tests to an extreme limit, M. Grenet suspended various weights to rods and allowed them to remain for a number of days. The result showed that for loads of 3,000 to 3,500 pounds per square inch no rupture occurred even after the expiration of three months, but when the loading was increased to about 4,000 pounds, rupture took place in one or two days.

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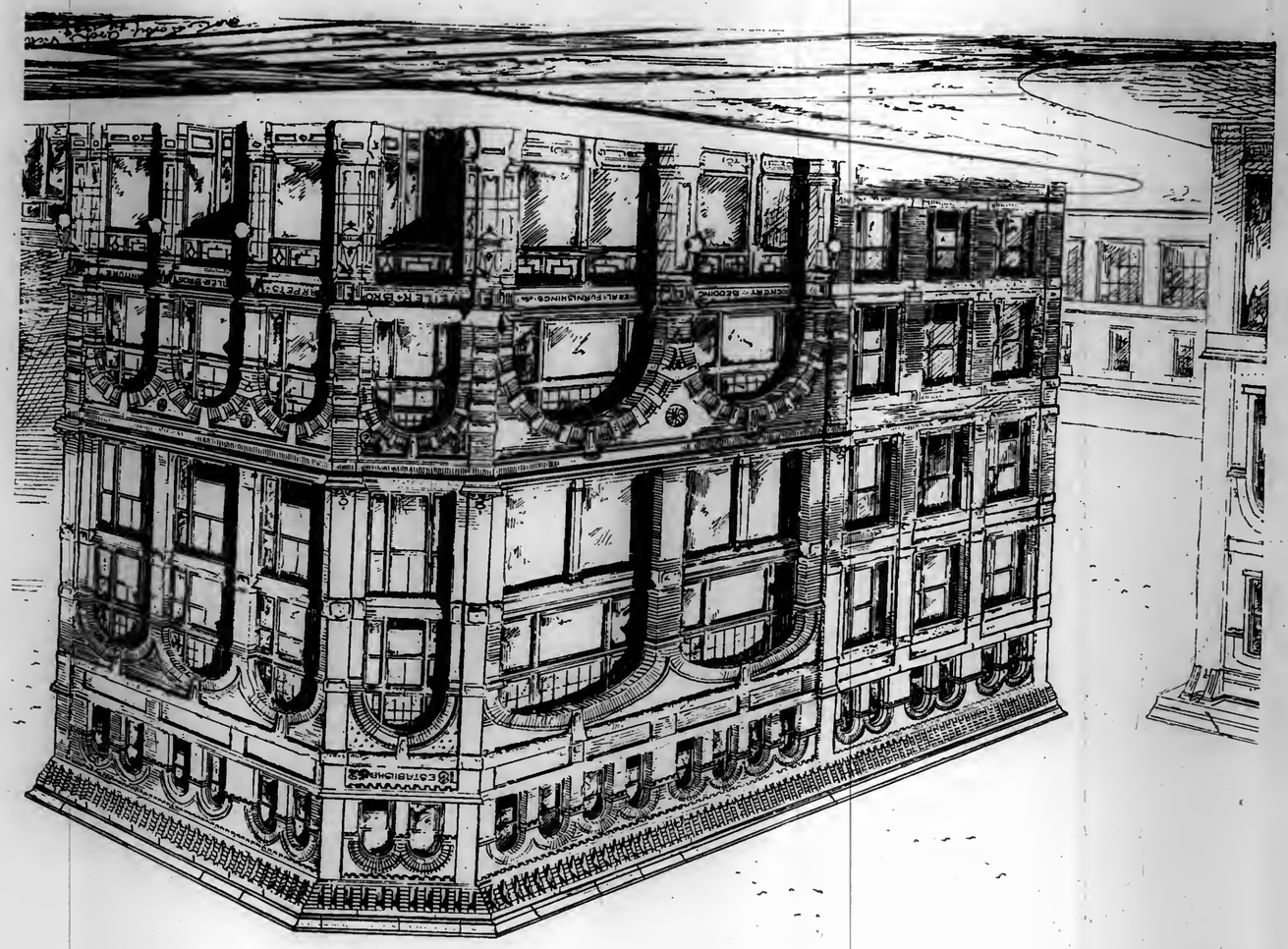

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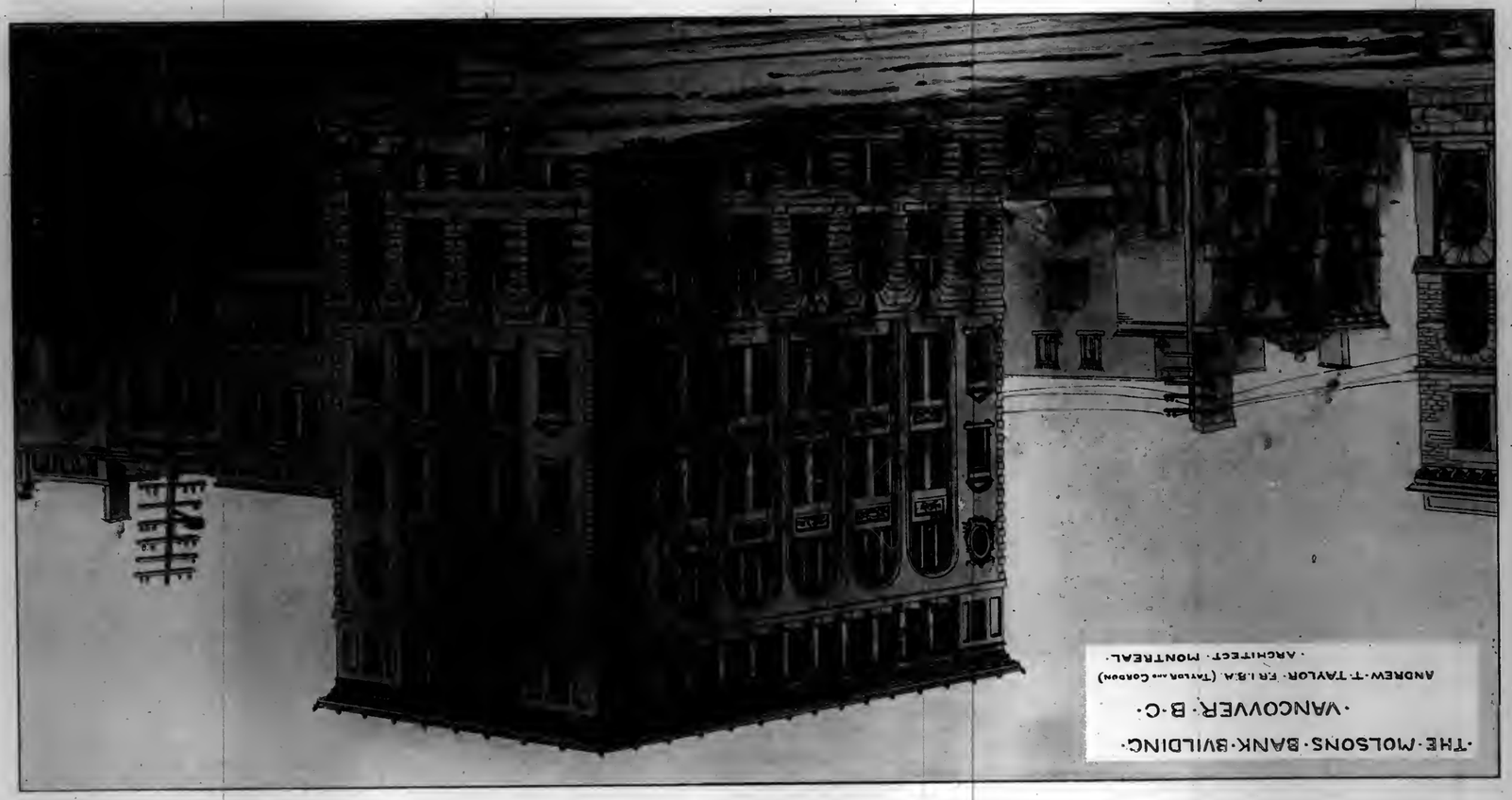

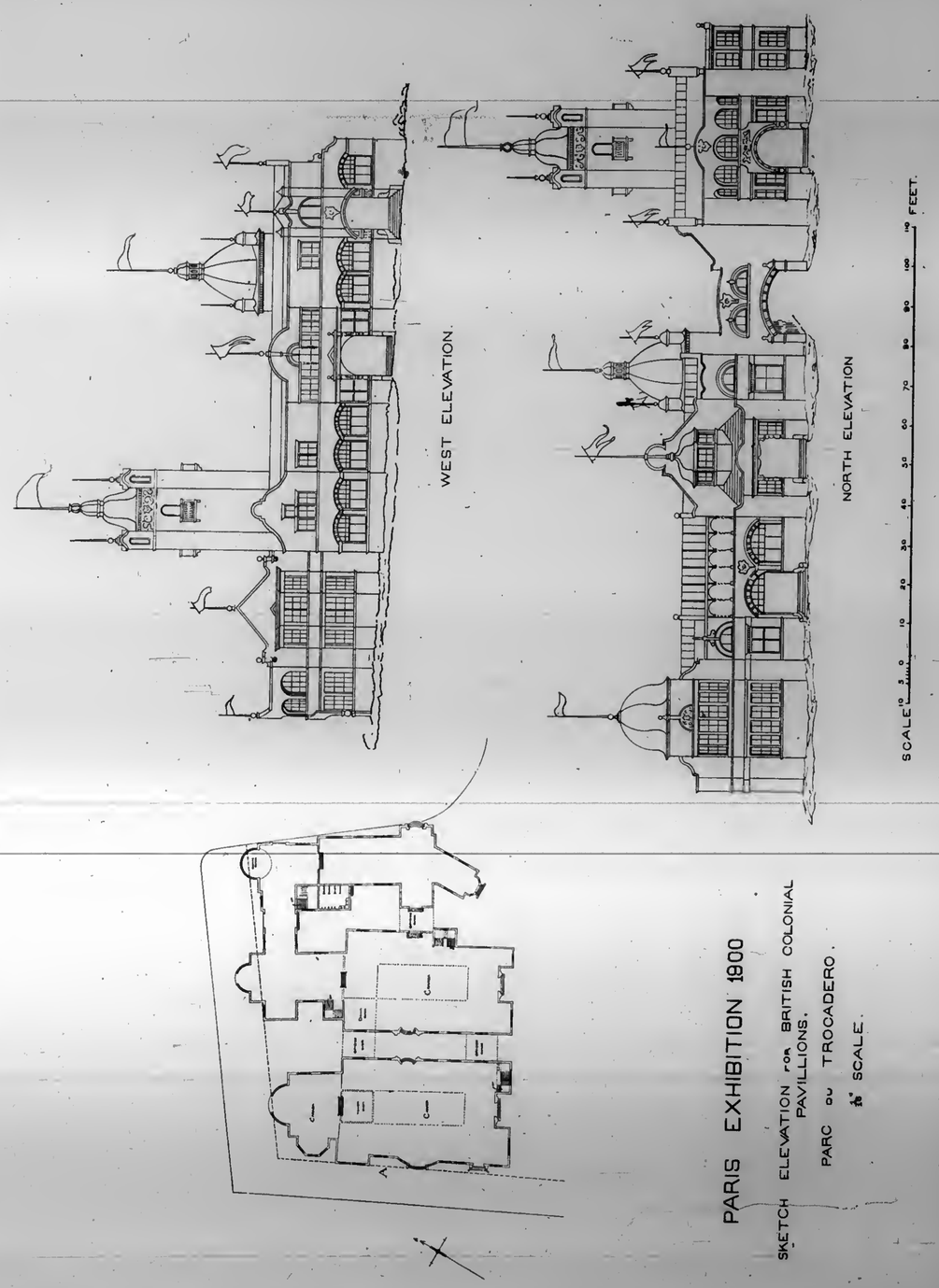

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The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to foreign subscribers is $2.50. Subscriptions are payable in advance. The Journal will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrears of subscription paid.

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The Future of the Ontario Association of Architects.

IN view of the near approach of the annual convention of the Ontario Association of Architects, the present seems an opportune time to say a few words regarding the present and future status of that organization. It will scarcely be denied by the most ardent friend of the Association that it lacks the life which should characterize every individual or organization having in view the accomplishment of a definite and useful purpose. Neither will the proposition be disputed that where advancement ceases retrogression begins. Can it be said that advancement has marked the recent career of the Ontario Association of Architects? If not, it follows that a retrograde movement has already commenced, and therefore prompt and earnest consideration should be given to the means best adapted to place the Association on a satisfactory basis. With this object, and acting in accord with the expressed wish of some of the most active members and well wishers of the Association, we recently invited from leading architects of the province answers to a series of questions, and suggestions which it was hoped might prove helpful to the management of the Association in dealing with this important problem. The questions, with the replies received, are published in this number.

The conclusion deduced from a somewhat careful

consideration of the subject is that the greatest drag on the progress of the Association is the incompleteness of the Ontario Architects' Act. The Act in its present form imposes upon the Association the necessity of maintaining examinations for students without placing students under obligation to present themselves for examination. It stipulates conditions which must be complied with by persons seeking to become members of the Association, but refuses to give to such persons the exclusive right to use the title "Architect." About the only advantage which the Act affords is that entitling registered architects who may be called on to give expert evidence in the courts to charge the same fee as a provincial land surveyor. This privilege, while perhaps of some value, is more than offset by the disadvantages which the act imposes. Some of the brightest young men in the profession are prevented by the terms of the Act from joining the Association and giving it the benefit of their ideas and efforts. The government has established and is maintaining at considerable expense a Department of Architecture in connection with the School of Practical Science Toronto—with what result? To give instruction to one or two students each year. If the government would amend the Ontario Architects' Act by restricting the use of the title "Architect" to properly qualified persons, and making it compulsory on students to pass the prescribed examinations, the attendance and results in this Department would shortly be more in keeping with the cost of equipment and maintenance.

In view of the hampering effect of the Act in its present form, should not the Association without further delay make one more effort to induce the government to grant the required amendments, and failing to obtain them, abandon its charter and seek to establish itself on a new basis, which would permit of its affairs being conducted in the manner best calculated to increase the number and interest of its members and enhance its usefulness? The Association cannot become a permanent success unless means can be devised of bringing into sympathy with it the rising generation of architects. Whether the amendments to the Ontario Architects' Act are granted or not, the Association should endeavor to establish—by means of monthly lectures or in some other way—means for the education of students, thereby exhibiting in a practical way its interest in their welfare. At present the students are asked to pass the examinations, but the educational means to that end are wanting.

Competitive Designs for Public Buildings.

THE new post office building at Chicago, the laying of the corner stone of which was recently made the occasion of a brilliant ceremony, is the first government structure to be designed by an architect in private practice, under the recent enactment which provides that designs for the more important public buildings of this character may be procured by public competition. Mr. Henry Ives Cobb, the architect of this building, contrary to past custom, was given prominent recognition at the public ceremonies. In view of the part taken by the Premier of Canada in the Chicago ceremonial the present might be an opportune time for the Canadian architectural associations to urge upon the Dominion government the adoption of the American system of inviting from the leading architects of the country competitive designs for important public buildings.

Conciliation Board.

IT is proposed to organize in Great Britain a National Conciliation Board, to adjust by conciliatory means all questions relating to the hours of labor, rates of wages and working rules, and by mediation prevent strikes and lock-outs and assist in the settlement of disputes that may arise in the building trades. In addition to representatives from the various national organizations of employers and workmen there are also to be district committees.

University of California Competition.

THE awards have recently been made in the competition for designs for the University of California. The first prize, amounting to $10,000, in addition to the customary architect's fees, has been awarded to M. Benard, of Paris. The other prizes have been assigned as follows: Howell, Stokes & Hornbostol, New York, $4,000; Des Pardelles & Codman, Boston, $3,000; Howard & Cauldwell, New York, $2,000; and Lord, Hewlett & Hull, New York, $1,000.

Toronto Municipal Buildings.

UNTIL a few days ago we entertained the belief that the county of York had agreed with the city of Toronto to pay interest on a sum not exceeding $400,000 as its proportion of the cost of the new municipal buildings. In this, however, we were mistaken. The fact is that the county authorities agreed to pay interest on about $80,000, 20 per cent. only of the above mentioned sum. On this small proportion of the cost of the building they want to be charged only 3½ per cent. Some of the most important departments of the city government, claim that the portion of the building which has been set apart for the use of the county, is fitted up in a much more elaborate and costly manner than the apartments which are occupied by the city. Complaint is already heard that the accommodation afforded by the latter is insufficient, and that no provision has been made for expansion. Under these circumstances no further concessions are likely to be made to the county, which has already secured the best of the bargain.

Proposed New Building By-Law for Montreal.

A FIRST instalment of the proposed new building by-law for the city of Montreal is printed in the present number. The remaining sections will appear in our December issue. This by-law was framed by a committee of the Province of Quebec Association of Architects, and was subsequently revised and approved by the Montreal Builders' Exchange and kindred associations whose interests would be particularly affected by its provisions, and also by a special committee of the Montreal City Council. Its preparation engaged the most earnest attention of the committee of the P.Q.A.A. for a year. It may therefore be regarded as the mature result of the inquiry and deliberation of men best qualified by training and experience to judge of the requirements. As such it should have an interest for architects, builders, owners of real estate and municipalities. The by-law is now under consideration by the City Council, whose approval is all that is now required to make it operative.

ILLUSTRATIONS.

RESIDENCE OF MR. T. C. SORBY, ARCHITECT, VICTORIA, B. C.—T. C. SORBY, ARCHITECT.

SHOP FRONT, VANCOUVER, B. C.—R. M. FRIPP, F. R. I. B. A., ARCHITECT.

RESIDENCE MR. JOHN HAMMOND, ARTIST, SACKVILLE, N. B. —BURKE & HORWOOD, ARCHITECTS.

The lower storey of the main house is built of an olive colored stone. The kitchen wing is frame on stone foundation.

The upper storey is frame covered with stained shingles. The exterior woodwork is painted an ivory white. The principal rooms on the ground floor are finished in hardwood.

The studio is a commodious room with a large brick fireplace, and wall space for painting large pictures.

Mr. Hammond has executed numerous commissions for the Canadian Pacific Railway Company, and is now at work on a large view of Nelson, B. C.

The studio fireplace gains interest in that it was designed by Sir Wm. Van Horne, who has for many years exhibited great interest in Mr. Hammond's work.

NEW METHODIST CHURCH, MOOSEJAW, ASSA.—PERCY BEESLEY, ARCHITECT.

The new Methodist church at Moosejaw comprises a church 71 x 35 feet and school-room 32 x 30 feet; the church and school-room being connected by means of patent folding partitions, enabling each room to be used separately if required. The accompanying perspective view shows a building designed in the early English style of Gothic architecture, the materials used being red pressed brick and terra cotta, with Calgary stone for base and dressings. The roofs and bell spire turret to be shingled. Heating is to be by means of an improved hot air system. Ventilation on a new principle with air flues and inlet ventilators and foul air extractors in connection with shafts carried through the roof.

The floor will be laid to a slight gradient.

Top portions of all windows in small leaded squares.

The roof will be framed in the strongest manner with an open collar beam and elliptical framing to principals, supported on stone corbels. The whole of the work is being designed and carried out under the superintendence of Mr. Percy Beesley, architect, of Moosejaw, whose plans were adopted by the trustees of the church a few weeks ago.

NOTE.—In connection with the publication in the ARCHITECT AND BUILDER for October of designs for pavillions for the Paris Exhibition, it should have been stated that the buildings were designed by Mr. C. Clowes, Arundrel street, Strand, London, W. C.

ENGINEERS' CLUB.

THE Engineers' Club of Toronto held its regular monthly meeting at the Rossin House on the evening of the 7th inst.

The following were present: Messrs. Canniff, Chewett, Chipman, Clement, Duff, Galbraith, Hanning, Hertzberg, Jennings, Smith, Speight, Spry, Stewart, Temple, Tully and VanNostrand.

The topic of discussion for the evening was "The necessity for a Topographic Survey of Canada." A congratulatory address to the Canadian Institute was adopted, the Institute having now been in existence fifty years.

The trunk sewer problem will be discussed at the next meeting.

PROPOSED NEW BUILDING AND FIRE BY-LAWS FOR OTTAWA.

CONSIDERABLE interest has been aroused by the recommendations contained in a report of a special committee of the Ottawa Board of Trade for the amendment and improvement of the building and fire by-laws of that city. The report is as follows:

"The committee appointed by your board to examine the existing fire and building by-laws of the city of Ottawa, after due deliberation beg to report that we find the said by-laws, on the whole, incomplete and also very confusing in arrangement and not at all adequate to the demands of a city the size of Ottawa. The committee deem it advisable that the city council should have the by-laws revised by a committee of experts, and think that in such a revision the following recommendations should be given careful consideration:

1.—That the city should have a building inspector who should devote all his time to the work; he should be an expert in all departments of building construction; with him should be deposited plans of all parts of new buildings (or alterations, additions or repairs to old buildings) which are affected by the fire and building by-laws, and that he should be held responsible for all building inspection.

2.—That the provisions of the by-law respecting scaffolding should be made more clear.

3.—That the present fire limit A should be divided into two limits. The principal portion of this limit should comprise all the buildings and constructions on lots fronting on Wellington, Sparks and Queen streets between the canal and the west side of Kent street, and on both sides of Rideau street to Little Sussex street and on both sides of Sussex street to George street. This area being composed of the greater portion of the businees part of the city, should, in our opinion, be governed by more stringent by-laws than those governing the rest or residential portion of the present class A. These by-laws should insist that all new buildings, constructions or repairs, etc., should be built throughout of brick and stone, protected structural steel or other non-combustible material, and that the walls of such buildings shall be regulated in thickness according to height, as provided by the schedule to the Metropolitan Building Act of London, Eng.

All beams carrying brick or stone walls should have fireproof protection. Every building should have a party wall for each 3,267 superficial feet area; and openings in such walls should be of regulated size and have fireproof doors on each side. Floors, ceilings and supports should be of non-combustible material; beam fillings should be insisted upon; joints should be filled in with mortar or other non-combustible material, and the spaces between joints blocked every few feet to stop drafts. Similar blockings should occur in the furrings when used. Stairs should be of non-combustible material. All supports, guides, framing and other work around elevators should be of metal. No outside cornice finish, sills or other work should be of wood; joints should have ends bevelled so that if burned the walls would not be wrenched by their falling. Sky-lights should be metal; party walls should be carried above the roofs; all chimney flues should have 8 inch casting, and proper construction of fire places and hearths should be insisted upon. Shingle roofs should be prohibited; all galleries or verandahs should be fireproof, and all cranes and hoisting jibs projecting from the face of any wall should be covered with non-combustible material.

4.—Any present existing building which does not comply with the requirements of this first class limit should not be allowed to be altered, but should be allowed to be removed, under proper restrictions, to a limit whose provisions it complies with. Any such existing building in this limit being damaged by fire to the extent of 35 per cent. of its value should be demolished. As to the other areas in the city, similar provisions of a correspondingly less stringent character should be adopted."

The recommendations contained in the report were discussed at a largely attended meeting of the Board of Trade, but action thereon was deferred. Some of the members declared that the adoption of such regulations would kill building operations, while others, including several of the prominent architects of the city and Mr. Surtees, late city engineer, asserted that they were such as should prevail in every modern city. The recommendations appear to be in line with the legislation adopted in recent years by leading cities of America.

Spasmodic advertising was never known to build up a business; continuous advertising has done it thousands of times.

THE O. A. A.—A SYMPOSIUM.

THE approaching annual convention of the Ontario Association of Architects will afford an opportunity, which should not be allowed to pass unimproved, to consider and adopt means of increasing the membership and usefulness of that organization. The prosperous conditions now prevailing would appear to make the present an opportune time for an effort in this direction.

Having in view this object, the editor of the CANADIAN ARCHITECT AND BUILDER solicited from leading architects throughout Ontario answers to the following questions, together with suggestions which might prove helpful for placing the Association on a more satisfactory footing :

1. In what directions might the efforts of the Association be most usefully and profitably directed ?
2. What can be done to increase the membership, and especially to bring the young men into the Association, and lead them to take an active interest in promoting its welfare ?
3. What can the Association do for the benefit of students which would be likely to meet with their recognition and appreciation, and advance the standard of architecture in Canada ?
4. What changes, if any, are required in the present policy of the Association and method of conducting its affairs ?
5. What would be the best means of bringing the Association and its work before public notice ?
6. Please state concisely any opinions or suggestions not covered by the above inquiries.

The following are the replies which have thus far been received :

TORONTO, Nov. 11th, 1899.

1. One of the ways in which the efforts of the Association might be most usefully and profitably directed is, it seems to me, in making the obtaining of the proposed change in our charter a live question on all occasions and at every opportunity,—especially when coming into contact with members of the local legislature,—so that an educative influence might be constantly exercised with a view to the cultivation of public opinion demanding the same restrictions in regard to architects as to physicians and lawyers.

2. This is a difficult question and may be taken as part of No. 4.

3. The reception of the efforts of the Association in behalf of students, has during the past five or six years, been so coldly received by the students themselves (with a few exceptions), that there is little encouragement for further effort.

Several of the busiest architects have spent a large amount of valuable time preparing examination papers for students who have been too indifferent, or lazy, to take advantage of the course of reading or study involved.

Many students have argued that the Association can do them no good and that the preparation for and the passage of these examinations, qualifying them to become members of the Association, is therefore useless trouble—forgetting that the study and discipline involved and the knowledge gained are alone quite worth the effort, and will amply repay from every point of view.

What, therefore, CAN the Association do under the circumstances? It cannot COMPEL the students to take advantage of any serious effort in their behalf. The door to the practice of architecture must be put under guard before our students will be induced to wake up to their own good.

4. One of the changes required in the present policy of the Association, and which I advocated when on the Council, is the reduction of the running expenses. I think we are in such a position as to call for the very minimum of expenditure. To this end all services should be honorary till the revenue warrants greater expenditure. Till this change is made it will keep a number out of the Association. I do not think they are doing right in the stand they are taking, and think they should have remained in the Association, even when the hard times made the payment of the fees difficult. They could, by their presence and vote, have dictated its policy.

What we need is esprit de corps, an unselfish devotion to the interests of the Association, a willingness to sacrifice our time and abilities for its welfare, a resolve to put good active men into office and to stand by them loyally. These things alone will go far to make the Association a success. Apathy will kill it.

I am, yours truly,

EDMUND BURKE.

LONDON, Ont., November 11th, 1899.

In reply to your circular letter asking for opinions and suggestions as to means of increasing the membership and usefulness of the Ontario Association of Architects.

Adopting the premises that the Association might be "on a more satisfactory footing," the cause of not being on a satisfactory footing may be found in the constitution, members or management. It is not a simple matter for any one person to locate the cause, particularly if that person be not on the inside. And because I cannot speak with definite knowledge of the workings of the Association, it would not be well for me to give answers to the clauses that might be based on imagination rather than facts.

But in a general way I would suggest that there might be more confidence and fraternity between the members, fostered in local organizations having regular meetings and reporting to the general body or "Grand Lodge" at other regular meetings. To that end the province might be divided into Association districts. Some modes of well known fraternal societies might be enquired into. These societies are generally successful.

Above all there should be a more harmonious spirit—a common cause to which all may put a hand, pulling all together rather than each his own way. Without a common bond of good fellowship and confidence in leaders or officers no association, not even an association of architects, will meet with success.

Yours,

HERBERT MATTHEWS.

HAMILTON, Ont., November 6th, 1899.

SIRS,—In reply to the circular letter received early in the month in reference to means to be adopted for improving the Ontario Association of Architects, I have little to say.

Having previously made suggestions and been subjected to a cold water douch by members of the Council and the Registrar in consequence, I do not care about a repetition of the amusement.

I will, however, make one answer to your list of questions—the first one—asking "In what direction might the efforts of the Association be most usefully and profitably directed?

My answer is : "In the direction of winding itself up and retiring at the earliest possible moment."

Yours truly,

R. W. GAMBIER-BOUSFIELD.

OTTAWA, Nov. 3rd, 1899.

Your vexed questions relative to O. A. A. are before me, but I doubt if I can help you ; however, here goes :

1. Inculcate its members with the necessity for professional etiquette. Institute a court or committee of enquiry, so that any case of unprofessional conduct of members may be dealt with and if necessary expelled from the society.
2. Keep down expenses and make fees as small as possible.
3. Worry the governments until a grant is made to assist students by establishing a school of architecture and fine arts with travelling studentships.
4. Am not posted upon the policy of O.A.A. Outside of seeking incorporation, did not know they had any.
5. By holding conventions in the principal cities, instead of confining it to Toronto, and allow members outside a chance to elect some of the officers, as it is now the outsiders are only a buttress to a Toronto society. In my opinion the society can never be provincial in its character until you hold your meetings outside Toronto, as the Toronto votes outnumber all the rest. I might cite the R. C. A., where the president lives in Montreal and secretary in Toronto.

Quebec Association is different, as there are no cities of importance outside of Montreal in Quebec province, their fourth largest city being only a suburb of Ottawa.

Local branches of O. A. A., if I may judge from Ottawa, will not succeed. We started a local society and failed. We made a lot of rules and by-laws which were broken ere the printer's ink was dry.

Yours truly,

JOHN H. W. WATTS.

TORONTO, November 10th, 1899.

SIR,—In reply to your questions—I am waiting, with interest, to know what the Council, which was specially charged with the consideration of means of placing the O.A.A. on a more satisfactory footing, will report as having been done and what it proposes after a year of deliberation. It should make suggestions more valuable than those of an individual member.

In the meantime I give some brief answers to your questions :

1. All members should attend the next Convention and seek to make it a success.
2. Make concessions, as to examination qualifications, in certain cases, and aim at a new enrollment of the architects of Ontario on January 1st, 1901, the beginning of the 20th century.
3. Students in all cases should be bound to study for and attend the annual examinations.
4. More frequent meetings of the Association in Toronto and formation by the Association of chapters in other cities.
5. Public illustrated lectures, advertised and reported in the daily papers.

WM. R. GREGG.

OTTAWA, Nov. 10th, 1899.

GENTLEMEN,—Your favor of 2nd inst. re suggestions for improvement to the O.A.A. received.

Not being a member of the Association I do not care to criticize its affairs.

I might say the reason I am not a member is because I have never been asked to become one, and for architects outside Toronto I see little benefit in being a member, to compensate for the trouble of intruding myself on the society.

Yours very faithfully,

E. L. HORWOOD.

TORONTO, November 11th, 1899.

DEAR SIRS,—In reply to your favor of November 2nd asking an expression of my views on the subject of improving the condition of the Ontario Association, I give you the following in answer to all your questions :

1. The Association must realize its actual position and accept it.
2. It should be run on straight business lines and thus cause its members to give it active support.
3. Meetings should be monthly, and standing committees on various branches should exist and report at these meetings.
4. Meetings should be held in the Association's own rooms, and these should be made attractive and be always open.
5. Inducements should be held out to the students to offer themselves for examination.
6. The Act should be so amended as to protect the public from traps erected by incompetent individuals calling themselves architects.
7. A broad-minded spirit of sociability should pervade the meetings, so that pleasure as well as gain might result.
8. In addition to a reduced annual fee, benefits should be provided for members outside the city of Toronto who would not be able to attend all the meetings.
9. New members and young members should be encouraged by all to take an active part in the Association's work.
10. Papers to be read at meetings should be arranged for at least a year before they are read.
11. Some distinction should be arranged for the member whose work is of the highest merit each year throughout the province.
12. Regular exhibitions of work should be held, and an annual excursion might be arranged.
13. Everything possible should be done to encourage the public to learn the difference between good, bad, and indifferent work.
14. The back dues of members who have dropped out might be struck out and these architects reinstated.
15. The whole profession in Ontario should realize that several institutions cannot succeed, and that only by united effort can success be obtained, and a spirit of concession on all sides should make it apparent that the Ontario Association of Architects, working under Act of Parliament, and on a strong financial basis, with constitution amended to suit all as nearly as possible, should be the proper medium through which our efforts to advance good architecture in Ontario should be made.

Yours truly,

F. S. BAKER.

LONDON, ONT., November 13th, 1899.

DEAR SIRS,—Your letter of November 2nd., with five hard questions, was received. The following is an unsatisfactory attempt to answer some of them :

1. The Association might do some good to the profession at large by establishing some means of regular communication amongst architects, regarding the actual problems which each member of the profession meets with from time to time. A consulting committee might undertake giving advice to any member who might have a difficult problem on hand, and all members could be urged to present their difficult problems, either before or after solution, for the enlightenment of others.
2. A satisfactory answer to the first question would make this question unnecessary.
3. Simple competitions, open only to students of the Association, with slight rewards and useful criticisms, should help all students in architecture who have any ambition.
4. Some changes in the policy of the Association seem necessary, but I cannot think of any to suggest.
5. Well written articles, describing the structural and artistic advantages brought about by the proper education of students, and published in all Canadian newspapers, will do more good than all the conventions we have yet held.

Yours truly,

FRED. HENRY.

HAMILTON, November 3rd, 1899.

GENTLEMEN,—In reply to your circular letter of November 2nd will say in answer to your first question :

1. A unanimous move to license architects.
2. By holding annual architectural exhibitions and giving prizes.
3. Same as above.
5. Same as first.

Promote a more friendly feeling amongst architects by holding frequent gatherings where papers of interest can be read and discussed.

Sincerely,

W. W. LACHANCE.

School of Practical Science,

TORONTO, November 10th, 1899.

DEAR SIRS,—In reply to your favor of the 2nd, I beg to say that I cannot see my way clear to answer the questions you put through the press.

If it is the desire of the Ontario Association of Architects to make any changes, I shall be pleased to assist them in any way possible, and can assure you that the School is interested in the success of the Association.

I am, yours sincerely,

C. H. C. WRIGHT.

We hope to receive additional suggestions for publication in our December number.

MANUAL TRAINING IN PRIMARY SCHOOLS.

The important announcement is made that Sir William C. McDonald, of Montreal, who has become widely known as the giver of several large benefactions to McGill University, has offered to equip and maintain for three years an institution in every province of the Dominion for the purpose of giving manual training to boys between the ages of nine and fourteen, attending public schools. It is the purpose to bring from Great Britain or the United States experienced teachers to conduct the work, and also to send several teachers from Canada to take a course of training in Great Britain and Sweden, who, on their return, should be equipped with information and enthusiasm to enable them to advance education of this character in the Dominion.

THE PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

ON the evening of Oct. 31st the new rooms of the above Association on St. Catherine street, Montreal, were formally opened. The ceremony took the form of a reception by the President and Council to members and invited guests, among whom were represented kindred art and scientific societies. An address of welcome was given by the President of the Association, Professor Capper. Later on in the evening were exhibited lantern slides illustrating the Cathedral of Notre Dame at Paris, and particularly the sculpture on the exterior of the building. Illustrations were likewise shown of the Parthenon, and of the sculpture adorning the building. A musical programme was also rendered.

The Council of the Association have decided to hold, in January next, in the Association rooms, an exhibition of architectural drawings and photographs, designed to exhibit the progress and development of the profession. The purpose is to have an exhibition of this character annually in the future.

ONTARIO ASSOCIATION OF ARCHITECTS.—TORONTO CHAPTER.

THE Executive Committee of the Chapter have elected as its officers for the ensuing year : Mr. E. Burke, chairman, and Mr. J. Wilson Gray, secretary-treasurer.

Two meetings of the Chapter have already been held, the first on October 9th and the second on Monday evening last.

Following out suggestions offered at the annual meeting in the spring, the executive are arranging to have the meetings this season of a more social character than formerly, and to this end they have been held at the Temple Cafe, in one of the handsome private dining rooms of that popular restaurant. Two very enjoyable evenings have been spent. After dining together a number of interesting professional topics have been discussed, and at the last meeting several of the members who had recently returned from visiting some of the large American cities gave an account of their trips. The introduction of the social element into the monthly meetings of the Chapter promises to be an attractive feature, the last meeting particularly showing this in the greatly increased attendance.

BY THE WAY.

THE suggestion made at a recent meeting of the York Pioneers that the monument of the late Governor Simcoe be placed in front of the new municipal buildings, instead of in Queen's Park, Toronto, is one that should not be carried out. Governor Simcoe was the first governor of Upper Canada, and, it is therefore fitting that his statue should be associated with the Ontario legislative buildings.

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SOME years ago the English insurance authorities raised the rates by 20 per cent. within certain defined limits of the city of Halifax, on account of the hazardous nature of the buildings. Fearing that similar action might be taken with regard to St. John, in view of the recent fire and the inefficiency of the fire equipment to deal with the tall buildings which have lately been erected, the local fire underwriters have called the attention of the city council to the necessity of improving the fire alarm service and protective appliances, but not a word seems to have been said about the use of fire-resisting materials.

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WITH the object of reducing to a minimum the fire risk, the management of the Paris Exposition have carefully regulated the width of doors and steps. All exterior doors will open in and out. Doors opening only inwards must remain open constantly. Emergency doors will bear inscriptions stating their purpose. An emergency lighting system for night use will consist of lamps bearing the distinctive red color. All wood of the framework in the buildings and all stairways will be rendered fireproof. All the floors, railings, and balustrades will also be fireproof. All awnings and canvas covering must be fireproof. A fire service, as nearly perfect as possible, will be established, with water piping and pressure sufficient for firemen's service.

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ONE hears the complaint even from the old lands across the sea that the functions and qualifications of the architect are but imperfectly understood by the masses. It is not to be wondered at, therefore, that in a comparatively new country like Canada there should exist in many minds the haziest notions on the subject. Some imagine the architect to be a man whose main business it is to draw pictures of houses on paper, leaving to the "practical man" the task of putting the materials together in proper form. Some such idea as this must have been at work in the mind of the client of a young architect of my acquaintance, who, on visiting his building while in course of construction, called aside one of the hod-carriers, and in a confidential tone enquired of him if the thickness of the walls and supports was about what was usually considered proper for a building of such character. The architect, on learning of the action of his client, instead of manifesting indignation, was quick to perceive and appreciate the humor of the incident.

× × ×

MR. Edward Hurst Brown states in the columns of a contemporary, the following amusing incident : The other day an employing bricklayer in New York city went to a certain job he had under way and, not seeing the work progressing as rapidly as he would have liked, took off his coat, and, picking up a trowel, began to lay bricks in an expert manner. The sight of a boss bricklayer actually engaged in laying bricks was so unusual that the journeymen stopped their work to gaze upon him. Then they began to whisper one to the other. Finally one of them left the job and hurried after the walking delegate. In the course of an hour or two this individual appeared npon the scene. 'Good morning,' said the boss bricklayer, 'is there anything wanted to-day?' Clearly here was a man working on the job who was not a member of the union, and it was the walking delegate's duty to demand his union card, and if he failed to produce it to insist that he be immediately discharged, and should the boss refuse, to order the men upon a strike. But the rules of the union did not contemplate the idea that a boss would actually work with his own hands. So the walking delegate studied the situation for a while, and finally said that he guessed nothing was wanted that day. Then he went to the Board of Walking Delegates and called them together in solemn council to decide the question as to whether an employer had the right to work upon a job himself unless he could produce a union card showing that he was in good standing. But as employers are not eligible to membership in the union, the problem became a very knotty one, and at last accounts the question had not been solved, and the boss was still working along with his men, and was running his own business to suit himself.

THE SAND-BLAST IN ARCHITECTURAL WORK.

OWING to the increased use of the sand-blast for producing designs on window glass, cutting ornamental effects on building stone, removal of corrosive substances from clogged drainage systems, the reduction of metallic surfaces for building trimmings and general architectural purposes, the accompanying descriptions

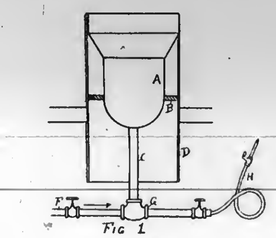

FIG 1

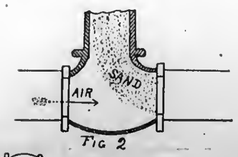

FIG 2

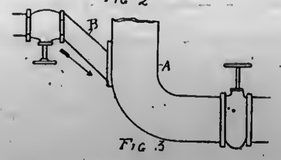

FIG 3

of how to build and use a sand-blast, together with a description of sand sifting apparatus, may be useful to architects and builders. If the sand-blast apparatus is properly built, the force which may be obtained from the stream of fine, hard and sharp grains of sand from the machine is remarkable. The discharge of sand is capable of cutting the hardest of substances.

First, the sand box should be made. This is marked A in Fig. 1. It can be made of sheet metal, rounded, and edges lapped where the seams come. A good size for ordinary work is 30 inches diameter of the lower part and about seventy-two inches entire depth. A wood case D is now built and the sand box held in this by means of the braces B. Next buy a T-joint G, and connect with the sand box with the pipe C. The sand will fall to the T-joint of its own weight, where it is met by the blast of air from the pipe F. The sand is carried with great force out through hose pipe H, where the workman directs the jet against whatever object is to be operated upon. The sectional view of the T-joint in Fig. 2 shows the idea. The air blast is obtained in

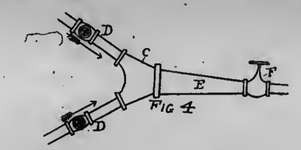

FIG 4

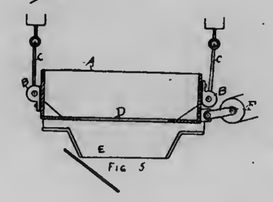

FIG 5

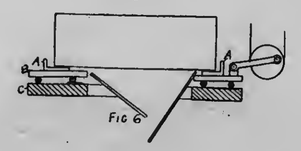

FIG 6

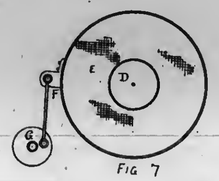

FIG 7

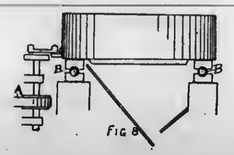

FIG 8

several ways. An air compressor can be purchased, but this is costly. Some have used common blowers with good effect. Steam may be used direct from the boilers on certain kinds of work.

Figs. 3 and 4 are given to show different methods employed for combining the air and the sand, instead of the system in Fig. 2. In Fig. 3 the pipe leading from the sand supply is rounded at A and the sand drops into the rounded portion, where it is met by the air discharge from pipe B. The air and sand combine and pass out through the discharge pipe with considerable velocity. Another pattern is in Fig. 4, in which the sand and the air are received at angles through pipe D, D, the latter joining in the lug C, where the contents of both pipes are combined and discharged through E into the hose pipe. The valve for governing the force of the jet is F. Almost all of the parts mentioned can be purchased of dealers in steam, gas and water pipe fittings.

Crushed quartz is usually selected, as its cutting powers are useful. Trap rock is serviceable owing to the roughness of its grains. Florida rock is also used. Some river and beach sands are available, if not worn too smooth.

The types of sifters shown in Figs. 5 to 8 can be made and provided with sieves ranging from 8 to 140 wires to the square inch. Two forms of hanging cradles are presented in Figs. 5 and 6.

To make the former, first build the cradle A about three by five feet and ten inches deep, of hard wood, edges square, and bottom cut out at D for the sieve. Set screw pin bearings B, B to the ends and link these to the ring bolts overhead by means of the pieces C, C. The chute E may be wood or sheet metal. The cradle can be operated by hand power or by belt power. The latter calls for the placing of a wood pulley on a stud at F and driving the same by means of a belt. Connection with the wheel and the cradle is made with a wood piece as shown. The form of sifter in Fig. 6 uses the same kind of a cradle, but the overhead suspension is replaced by underneath supports C. The latter is 2 inches wood planking, provided with four small steel rolls in bracket bearings. The cradle bears upon two lipped pieces of wrought iron adjusted as at A, A. The lipped pieces are riveted to the base piece B, which is of cast iron. The lower side of the base piece bears on the rolls and the necessary vibration is given by means of the belt-and-pulley connection, as in Fig. 5. Fig. 7 is a top view of a rotary sieve. The cradle is made cylindrical and wired as at E, and provided with a central sand chute D. A bracket is bolted to the side of the cradle at F, and the required sifting movement procured by means of the revolving wheel and connection at G. Fig. 8 is a side view showing the belting system at A for turning the wheel. This cradle can be placed on ball bearings, as shown at B, by using grooved tracks for the balls, or the cradle may bear on a single smooth ring. Zinc or sheet iron may be used for constructing the cradle.

Patterns of ferns, monograms, artistic ornamental patterns, and figures of all descriptions can be cut upon plate glass, stone and many of the metals by means of cutting out the pattern first in zinc, gelatine, hard sheet rubber or other thin material to protect that part of the surface which it is desired not to touch. The jet of sand is played upon the exposed surfaces and the desired design rapidly cut.

When cleaning corrosive matter from clogged drainage systems, care should be taken not to apply the discharge too long upon any exposed metal, otherwise the piping may be damaged. The accumulations of foreign substances on basement stonework may be removed with the sand blast and the stone made to appear like newly-cut. None of above apparatus is patented.—R. F. Fells in American Architect.

The Ontario Association of Architects have asked the Provincial Government to instruct the School of Practical Science to undertake a scientific test of Canadian timbers, with a view to ascertaining their structural strength and other features. The School of Science possesses the necessary machinery for testing timber, but a government grant is necessary to meet the expense of cutting the wood, under proper supervision, selecting the proper varieties for comparison, and obtaining data as to the age of each tree and the condition of growth.

MANUFACTURES AND MATERIALS

WILLIAM A. GUNN.

THE announcement of the death at his home in London, Ont., on October 21st, of Mr. William A. Gunn, secretary of the McClary Manufacturing Company, caused widespread regret. The cause of death was Bright's disease, from which the deceased had for some time been a sufferer. His last illness dated from August, when he was obliged to cease business activities. By his death the company with which he was connected suffers a serious loss, and the city of London, in which he was born, and which was the scene of his active and useful career, is deprived of one of its most highly esteemed and valued citizens.

The late Mr. Gunn was a son-in-law of Mr. John McClary, and for twelve years previous to his death had

THE LATE WILLIAM A. GUNN.

been secretary of the McClary Manufacturing Co., in which capacity he displayed business ability of a high order coupled with unflagging industry. He was also a director of the Ontario Loan and Debenture Co.

A wife, four sons and two daughters comprise the bereaved family.

The funeral was attended by three hundred and fifty employees of the company and a large number of the leading citizens.

MINERAL PRODUCTION OF QUEBEC.

FROM the annual report of the Inspector of Mines it is learned that the total value of the mineral production of Quebec last year was $1,673,337, of which bricks alone represent a value of $600,000 and lime of $140,000. About $500,000 worth of asbestos was mined and $200,000 worth of copper. This leaves about $200,000 worth of iron ore, gold, mica, chrome ore and slate. Phosphate mining, once so important an industry, has declined until at the present time it amounts to very little.

A representative of the Pierre Mahy Glass Works, of Rabusart, Belgium, was in Chatham, Ont., recently, with a view to the erection there of a window glass factory.

The Fairbanks Company, of Montreal, are sending out to architects and others a circular directing attention to the merits of Fairbanks valves. A copy of this circular will be mailed on request.

It is reported that a joint stock company is to be formed, composed of Breslau, Guelph and Toronto business men, to acquire Mr. Fred Shaefer's brick yards at Breslau, the intention being to manufacture pressed brick.

A copy of a little booklet has been received from Messrs. Henry Pels & Company, 66 Broad street, New York, which contains particulars and illustrations of machines for punching and cutting structural iron and steel by hand.

A charter has been granted to the Imperial Varnish & Color Company, Toronto, with a capital stock of $100,000, to manufacture varnishes, japans, enamels, paints, colors, insulating materials, etc. The provisional directors are J. W. Flavelle, J. M. Sparrow, I. F. Monypenny, James Monypenny and James Hales.

The extensive works of the Londonderry iron Co., at Londonderry, Nova Scotia, which have for some time been in the hands of a liquidator, were recently put up for sale at auction, and purchased by Mr. H. S. Holt, of Montreal, for the sum of $153,000 cash. It is said to be the intention of the new owner to make improvements and operate the works.

A couple of errors crept into the description published in our last issue of the works of the Georgian Bay Portland Cement Co. at Owen Sound. The capacity of the storehouse should have been given as 40,000 barrels, and it should have been stated that the engine employed to operate the works is a Jerome Wheelock compound condensing engine, manufactured by the Goldie & McCulloch Company, of Galt.

The Robb Engineering Company, of Amherst, N.S., have published a new illustrated catalogue explanatory of the construction and advantages of the Robb hot water heater. The company state that in a short time they expect to be in a position to supply a larger series of heaters than are listed in this catalogue. The catalogue contains a number of testimonials from architects and others who have given the Robb heater a trial.

A Canadian correspondent of the Clayworker has this to say regarding our native terra cotta: "Ontario sampled architectural terra cotta some twenty years ago, and used it as something that was sure to melt in the first shower or go to pieces after the first Ontario winter, but it remains, to the astonishment of some and the disgust of the stone cutter and quarry man. Its being talked against, kicked at, belittled and ignored has proven like the Irish peddler's tin—'the more you rub it and scour it the thicker it grows.' Time removes prejudice, but time uses up life, too, and the pioneer grows old before the harvest comes."

PERSONAL.

Mr. M. B. Aylsworth, architect, has recently opened an office at No. 23 Jordan street, Toronto.

The death is announced at Hamilton of Mr. Josiah Baker, an old resident of that city and formerly a well known contractor. He was 73 years of age.

Mr. A. H. Gregg, junior member of the firm of Gregg & Gregg, architects, has returned to Toronto after a residence of more than a year in the United States.

Dr. P. H. Bryce, secretary of the Provincial Board of Health of Ontario, has been elected president of the advisory council of the American Public Health Association.

Mr. Cornelieus McGourty, a well-known contractor of St. John, N.B., was recently killed by an explosion of dynamite. By his warning the lives of eight men who were standing near were saved.

Mr. W. T. Marion, of the Dominion Radiator Company's staff, was presented with a purse of gold and the good wishes of his fellow employees on his departure with the Canadian contingent for the Transvaal.

Mr. James A. McMahon, of St. Catharines, a well known contractor, died recently from injuries received by a fall at the hote in Toronto, where of late he resided. Mr. McMahon constructed the bridge over the St. Lawrence river at Coteau and was associated with the late Mr. Sylvester Neelon in several important undertakings.

THE BUILDER

[THIS DEPARTMENT IS DESIGNED TO FURNISH INFORMATION SUITED TO THE REQUIREMENTS OF THE BUILDING TRADES. READERS ARE INVITED TO ASSIST IN MAKING IT AS HELPFUL AS POSSIBLE BY CONTRIBUTING OF THEIR EXPERIENCE, AND BY ASKING FOR PARTICULAR INFORMATION WHICH THEY MAY AT ANY TIME REQUIRE.]

Cement Floors for Cellars and for Sidewalks.

To make a good floor for a cellar, or to lay a good lasting sidewalk with cement requires considerable knowledge of the materials employed for the purpose, and some skill in their manipulation. For cellar floors, the first thing to be done is to prepare a foundation for a thick layer of concrete; this foundation—or bed—should be well tamped down, and afterwards a layer of gravel, cinders, or broken stones or brick, should be put in from three to four inches thick,—if the bed is of gravel from the start, that will be sufficient—this should be well drenched with water, and properly tamped until the bottom appears solid. The concrete, to a depth of three, four or six inches, may be put on this bed, being careful to tamp it solidly down to bed. If a smooth surface is desired, a thin coat of cement and sand should be well troweled over this; the cement being formed of one measure of Portland cement, and three of clean, sharp sand, mixed dry, and then moistened to suit. In preparing the concrete, the first thing required is a water-tight box or platform. Measure the correct proportions of cement and sand, then mix thoroughly dry; moisten slightly with clean water to make a stiff plastic paste. Drench the aggregates,—which may be broken stone, broken bricks or gravel of the proper size—well with water. Spread the proper proportion of this aggregate over the mixed cement and work it in with it quickly and thoroughly, then deposit in place as quick as possible and ram well into a compact mass. Place layer upon layer until the required thickness is obtained. If only three or four inches of a thickness is required, this may be put down at once; but, if several layers are necessary, then each layer should be allowed to remain twenty-four hours before the next is applied. Always clean and wet the surface of the concrete thoroughly before applying the next layer. If the area is large, and several mixings are necessary, connect the joinings with neat cement mortar, and if possible arrange the different layers so that the joints will be broken. Twenty-four hours after the work is finished, the floor should be moistened with clean water, and this practice should continue for a couple of weeks in order to get the best results. The temperature should be kept between 35 and 70 deg. Fahr. until crystallization has set in, which generally takes from twenty to thirty hours. The proper proportions for the concrete should be, one measure of cement, three measures of clean sharp sand, and six measures of broken stones, bricks or other suitable materials that will pass through a two-inch round hole. Mix as directed in the foregoing. In preparing for sidewalks, extra care must be taken to insure the best results. When there is danger of frost, dig out the foundation eleven inches below the surface except at the outside edges, where a narrow trench two feet deep should be dug. Fill to within five inches of the surface with screened and washed cinders, pretty coarse gravel, or broken stones, well rammed and levelled. On this foundation place the concrete base four inches thick, well tamped. For extra heavy traffic this concrete should be six inches or more, in thickness. In very important work, iron rods or expanded metal laths are sometimes bedded in the concrete to prevent cracking. The top, or finishing coat, should be about an inch thick, and should be composed of one part cement, one part clean sand, and one part of crushed granite, crushed quartz or fine clean washed gravel; the first being the best. The concrete base must be roughened, cleaned and wetted before the finishing coat is applied. Level the surface off with a wooden float and straight-edge, obtaining the proper grade. The finishing coat should just have sufficient water to give it the consistency of fresh-dug earth that will stick in a ball when pressed in the hands. When about to set, trowel hard with a steel trowel or roll with brass roller. Cut the surface into blocks of proper size to prevent cracks, and to allow for contraction and expansion, cover with boards, paper, straw or sand to protect against atmospheric changes and to keep in the moisture. After twenty-four hours keep the surface wet for at least two weeks—this is important. The top coat should be applied before the base is dry, to keep it from separating from the foundation. Cellar floors can be laid for, from 8 to 15 cents per superficial foot, and sidewalks can be laid for, from 12 to 20 cents per foot, according to the quality of the work. As a rule it takes 2½ barrels of cement to lay 100 feet of walk. One finisher and two helpers will lay from 300 to 800 feet of walk in a day, depending on the style of finish. For ordinary cellar floors three inches thick, one barrel of Portland cement and three barrels of sand will cover five square yards. Barnyards should be paved with concrete so that all the drainage may be carried to a pit. Stable floors, with drain at end, can readily be made of concrete and cement, and are lasting, sweet, and easily cleaned, and when properly made, form the healthiest of floors for horses or cattle. Cement may be colored without injury, if the best metallic oxides, without sulphur, are employed. Venetian red or lamp black should never be used; they run and fade and soften the cement. Excelsior carbon black, is the strongest black known. The following colors, if mixed with either prepared lime flour, or stainless Portland cement mortar, give excellent results: For black, use 2 per cent. excelsior carbon black; for red, use 10 per cent. best raw iron oxide; for brown

use 6 per cent. best roasted iron oxide; for buff, use 10 per cent best ochre; for blue, use 6 per cent ultramarine; for white, use marble dust or white silica sand. Other tints may be obtained by compounding these ingredients in such proportions as may suit the taste or requirements. Floors may be made to assume the appearance of tiled floors by a judicious rendering of colored cement, though extra care must be taken in putting down the cement in order to keep each color or tint within its own boundary. It is well to put thin laths between the joints which may be removed when the cement is slightly set.

Framing and Shingling an Eyebrow Window.

As the "eyebrow dormer" has become part and parcel of Canadian practice in building, a few hints regarding its construction and finishing may not be out of place. The eyebrow window, owing to its gracefulness, has, in many cases superseded the old-fashioned dormer, where effect and not use is sought. For the purpose of describing the curves and constructive details of an eyebrow window, proceed as follows: Draw a line A B, Fig. 1, which represents the top of the main roof

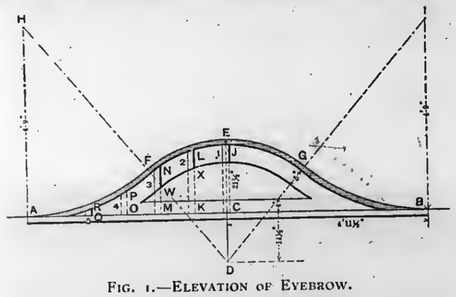

FIG. 1.—ELEVATION OF EYEBROW.

boarding. At right angles to A B, draw a centre line, D E. Measure each way from the centre C, a distance of 4 feet 11½ inches as figured, from C to B, making C E 21½ inches. Now on D as centre describe the arc F E G. At right angles to A C B draw the lines A H and B I, each equal to 4 feet 9 inches, connect I D and H D. Now with I and H as centres describe the arcs G B and F A; also describe the remaining curves from the centres I, H and D as shown. Space the ribs from the centre C as at K M O Q and numbered 2, 3, 4, 5. The sash may be obtained by using the same centres. In Fig. 2 a vertical section of the window is shown in which the curves of the ribs are presented and the junction of the window with the roof. The pitch of the roof in this case is one-half or at an angle of 45 deg. The vertical height of the window frame as taken from C E, Fig. 1, is shown by the letters C E. To find the position and heights of ribs 2, 3, 4 and 5, make C R, C P, C N and C L each equal to Q R, O P, M N, and K L, Fig. 1. Along the upper edge of the rafter from T to V set off 6 feet 7½ inches. From S, the top of the roof board, draw a line, S U, at right angles to the edge of rafter. Upon this line with a radius of 11 feet 1½ inches describe the curve of the roof S E. The thickness of the boarding as shaded will be the next and only other curve to be described from the last mentioned centre, touching the top edge of the rafter at V and the top of the window frame at J. As the radius for describing the flat curves is considerable and awkward to manage, all of them from first to last may be produced with a little care and judgment by bending a flexible strip of even thickness from point to point as measured. All the upper edges of the ribs numbered 2, 3, 4 and 5 and lettered to correspond at the front face of the window frame J L N P R must be curved as shown from the points lettered at the face of the window to the top of the rafter at V. All the ribs cutting against the inner face of the window frame and the centre rib, as well as the two on the right and left of it, have to be made to a depth, as at L X and N W, Fig. 1. It will be seen from Fig. 1 that the top edge of each of the ribs, except the centre one, requires to be beveled in line with the curved edge of the window frame. It is also evident from the direction of the curves R S, P 4, &c., Fig. 2, that the top edge of the window frame itself must be beveled, being square only at its top squared edge at A and B. On a roof of much less pitch than the one shown it may be desirable to lessen the height of the window or greatly extend the distance T V, Fig. 2. Perhaps both points may be deemed necessary in cases of very low pitch. Fig. 3, shows several examples of eyebrow windows in situ, the top one

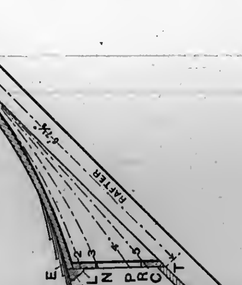

FIG. 2.—SECTION OF EYEBROW.

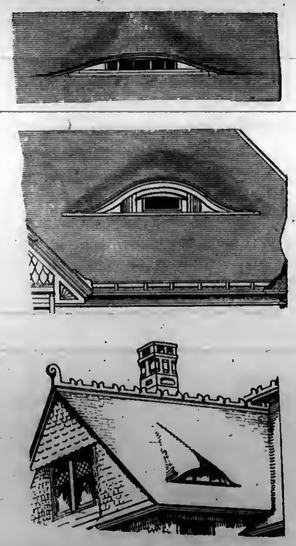

FIG 3.—EXAMPLES OF EYEBROWS.

having but slight elevation, while the second more nearly approaches in outline Fig. 1. The third example is built on a steep roof, and shows up quite well. It will be noticed that in all these examples the shingles

are continued over the tops of the eyebrows in their regular courses without a break. There are no valleys shown other than what the shingles themselves form. This is one of the taking features of this style of dormer. Any attempt to form a valley and thereby make a break in the roof, will have a tendency to destroy the gracefulness of the work. With a little care the shingling over this style of window can be done so as to give the roof a fine appearance. Fig. 4 shows a projecting eye-

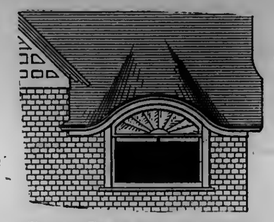

FIG 4.—PROJECTING EYEBROW.

brow window over which is carried the whole width and depth of main cornice. The same rules of construction apply to this style of window as described in the foregoing.

"THE MONTREAL BUILDING BY-LAW OF 1899."

BELOW will be found a first instalment of the proposed by-law bearing the above title now under consideration by the City Council, to regulate the construction, removal and inspection of buildings in the city of Montreal, and to prevent accidents by fire:

DEPARTMENT OF THE INSPECTION OF BUILDINGS.

SECTION 1.—There shall be in the city of Montreal, a department, to be called the Department for the Inspection of Buildings, which shall be charged with the enforcement of the provisions of this by-law, as hereby providing for the survey and inspection of buildings and the protection of the same against fire or accident.

The said department shall have its office in the City Hall, and shall be maintained at the expense of the city.

RECORDS OPEN TO INSPECTION.

SECTION 2.—The records of the department shall be open to city officials, and all parties whose property may be affected by the matters to which they relate.

STAFF OF DEPARTMENT.

SECTION 3.—The staff of said department shall consist of a chief, to be known as the inspector of buildings, and as many assistant inspectors as may be found to be necessary from time to time, and a clerk appointed by the city council.

SECTION 4.—In all future appointments the inspector of buildings shall be an architect or a practical man of experience in the construction of buildings. Assistant inspectors shall be men of experience, and experts in building construction, in its several branches, one of whom shall have a practical knowledge of electrical work as applied to the lighting of buildings.

SECTION 5.—Neither the inspector nor the assistant inspector be employed or engaged in any other business, or be interested in any work for buildings, or for furnishing of materials.

SECTION 6.—In case of the temporary absence or disability of the inspector, he may appoint one of the assistant inspectors as his deputy, who shall, during such absence or disability, exercise all the powers of the inspector.

SECTION 7.—The assistant inspectors, for any neglect of duty, may be suspended by the inspector, and the suspension and cause of same shall be at once reported to the Fire Committee who shall take action on same as they may deem fit.

DUTIES OF INSPECTOR.

SECTION 8.—It shall be the duty of the inspector, as chief of his department, to issue permits for the erection, enlarging or alteration of buildings, in accordance with the provisions of this by-law; keep a record of the same, with a description of the construction, sanitary appliances, heating apparatus, electric apparatus, elevators, and all matters relating to the construction or alteration of buildings in the city.

It shall be duty of the inspector, on receipt of an application for a permit, accompanied by the plans and specifications for the proposed building, or alteration, to carefully examine the same, and ascertain if the supports, beams, and construction of the proposed building, are properly shown in said plans and described in said specifications, and that they are in accordance with the provisions of this by-law. If the inspector is satisfied that they conform to this by-law, he shall, within a period of eight days from the date of application, return said plans and specifications, and issue a permit as hereafter provided for. If they do not conform to this by-law, he shall refuse to issue such permit.

It shall also be the duty of the inspector, upon issuance of a permit, to transmit to the City Surveyor the requisite notices for lines, levels, drains, and for the use of streets or squares for building material; he shall also notify the Superintendent of the Water Works of the services required, and shall further transmit to the City Treasurer's office, a statement of all fees and water rates to be paid.

SECTION 9.—The inspector or his assistant shall examine al buildings in course of erection or alteration, as often as practicable, and in case of violation of the provisions of this by-law, and refusal to comply therewith, they are to report the name of the owner, architect, builder, or master mechanic concerned in the building where such violations have occurred, and all other matters relative thereto, to the clerk of the Recorder's Court, that proceedings may be taken against the party or parties concerned, according to law, and it shall be the duty of the clerk in the Recorder's Court, on the request of the inspector, to prosecute all parties infringing this by-law.

RIGHTS OF INSPECTOR.

SECTION 10.—The inspector or his assistants shall have the right to enter any building in course of construction, alteration, or enlargement, or any building which has been reported to him as in a defective or dangerous condition, or which he has reason to believe is in a dangerous or defective condition, either in regard to its construction or sanitation. In case of an appeal from a decision of the inspector, any member of the board of appeal shall have the same right.

SECTION 11.—The inspector or his assistants shall have the right to enter any building damaged by fire or through accident, and to examine the same with a view to ascertain the cause of the accident, and the condition in which the fire or accident has left the building, and make and keep an official record of the same.

They shall also have a right to examine buildings or premises, with a view to ensure the safe storage of combustibles, as hereafter prescribed in this by-law and to report on the same.

SECTION 12.—The inspector shall have full power to pass upon any question arising under the provisions of this by-law, relating to the manner of construction, or materials to be used in the erection, alteration, or repair of any building, or respecting the steps necessaryto be taken to ensure the safety of any building that has been reported, or is known by the inspector to be in a dangerous or defective condition, either in regard to its construction or sanitation.

SECTION 13.—The inspector shall have authority, if he finds any building or part thereof, or any staging, or other structure connected with a building, or any other structure, in such a condition as to endanger life or limb, and whereby the immediate adoption of precautionary measures, or by the demolition of the dangerous portion of said building, staging, or structure, such danger may be averted, to cause such precautions to be taken, or demolition to be made, or to cause such work to be done as may be necessary to render such building or part thereof, or staging or structure safe, after having given notice, either in writing, or personally to the owner, lessee, occupant, or agent of said building and the inspector shall have the right to enter such building or premises, with such assistance as he may require, and have the said building or structure secured or taken down, and the public protected, at the expense of the owner, or other party interested, and the costs incurred by the inspector in the performance of such work, shall be paid for out of an appropriation to be voted by the city council to the fire department, at the beginning of each fiscal year, and any portion of said appropriation expended by the inspector in the execution of such work, shall be accounted for by him from time to time as may be determined by the fire committee, to be recovered with costs from the owner or owners, or other party interested, in any court having jurisdiction in the matter. Should such work as hereinbefore mentioned be urgent, and in the opinion of the inspector require to be done without the delay necessary in

notifying the owner, or other party interested, he shall have the right to have the work done and to recover the cost of the same as hereinbefore provided.

SECTION 14.—When the inspector is satisfied that any building or structure, or portion thereof, is being erected, constructed or altered, or has been erected, constructed or altered, in violation of, or not in compliance with, the provisions of this by-law, or in violation of the statement, plans and specifications submitted to and approved by the inspector, or of any permit issued by him, or that any order or direction made thereunder has not been complied with, he shall serve the owner or owners with a notice to remove such violation immediately after the serving of such notice.

In default of compliance with such notice to the satisfaction of the inspector, he may in his discretion institute an action or proceeding at law against the owner or owners before any court having jurisdiction therein, to restrain, correct or remove such violation, or to prevent the occupation or use of any building or structure erected, constructed or altered in violation of the provisions of this by-law, and said court shall, unless there has been an appeal from the accusation or order of the inspector as herein provided, hear the parties in the case, and give judgment thereon, or shall issue an order enjoining and restraining all persons from doing work upon such building or structure, or for occupying or using such building or structure, until the hearing and determination of said action and final judgment thereon.

No officer of said department, acting in good faith and without malice, shall be liable for damages by reason of anything done in such action or proceeding.

RIGHT OF APPEAL FROM DECISION OF INSPECTOR.

SECTION 15.—Should any question arise between the inspector and the owner, or his legal representatives, or should the said party object to any order or decision of the inspector, they shall have the right, within three days after the giving of such order or decision, to appeal from the same.

Should the inspector refuse to issue a permit as required by this by-law, the applicant for such permit shall, within three days after such refusal, have the right to appeal from said decision.

Should the inspector incur any expense chargeable to an owner, or should he order any person to incur expense other than provided for in section 11 of this by-law, the said owner or person shall have the right, within three days after the issue of such order, to appeal from the same.

Any person appealing from any order or decision of the inspector as herein described shall, within the time above mentioned, give notice to the inspector in writing that he does so appeal.

BOARD OF APPEAL.

SECTION 16.—The said Board of Appeal shall consist of an architect recommended by the council of the Province of Quebec Association of Architects, a competent civil engineer recommended by the council of the Canadian Society of Civil Engineers, and a master builder. The appointment of said Board of Appeal to be made by the city council.

SECTION 17.—The first named person appointed to said board shall serve for three years, the second named shall serve for two years, and the third named shall serve for one year. After the expiration of the first term, each member of the board subsequently elected shall hold office for three years.

Each member of the board shall be paid by the city a fee of $5.00 for each case adjudicated on, and the city shall recover the amount of said fee from the appelant, in all cases where he is declared to be in fault.

SECTION 18.—No member of said board shall sit or adjudicate in a case in which he is interested, and in case of such disqualification, or in the absence of any member the other two members shall have the right to appoint a substitute, of the same profession as the absent member.

SECTION 19.—If two or more members of the board are disqualified, or if they are absent, the inspector shall appoint one substitute, the appelant another, and the two so appointed shall appoint a third, and the said parties shall have the same powers as the members of the board.

SECTION 20.—The said board shall not adjudicate on any question of law, but on all matters referred to them respecting the construction or sanitation of buildings, or the application of this by-law to the erection or alteration of any building, or to any order or decision of the inspector which has been objected to, and appealed from, as provided for by section 15 of this by-law, the decision of the board, or of a majority thereof, shall be final and binding on both parties.

PERMITS FOR ERECTION OR REPAIR OF BUILDINGS.

SECTION 21.—No building shall after the passing of this by-law be erected, or altered, and no work affecting the strength or fire risk of any building, or part thereof, shall be done without a permit from the inspector, nor except in conformity with the provisions of this by-law.

Permits for use of street shall be obtained and paid for as provided in section 25; but in no case shall more than ⅓ of the street be so occupied, and such occupation shall only be for deposit of materials required for the building.

WIDTH OF STREET ALLOWED TO DEPOSIT MATERIALS.

In no case shall the permit to deposit materials on the street exceed one-third of the street, between curb stone and curb stone. Where street car rails are laid on any street, such materials shall not be laid within eighteen inches of the nearest rail.

REGARDING FOOTPATHS.

In front of any building erected on the line of the street, the footpath shall be at all times clear of any obstruction. In cases where footpaths shall be required to be raised above its actual level, said footpaths shall be strongly built so as to carry a minimum load of 150 lbs. to the square foot, and proper steps and railings to give access to and from it. Said footpaths, whether on the street level or raised, shall be roofed to at least eight feet high clear from the path, and the framing of said roof shall be made sufficiently strong so as to carry safely a roof of at least (2) two inches thick, and to bear the weight of any falling material from upper stories—said roof to be water-tight.

SECTION 22.—Before the erection, repair, or material alteration of any building, the owner, architect, or builder thereof shall file with the inspector, a statement in writing on forms or blanks according to schedule "A," appended to this by-law, to be issued for the purpose by the inspector, and said statement shall give the intended occupation of the building, its dimensions and manner of construction, and all information necessary for the inspector to determine whether the proposed building is suitable for its intended uses, and its construction is according to the provisions of this by-law. The said statement shall be made under oath, and shall also mention:

1.—If a street line or level is required.

2.—If a portion of a street or square is required to be temporarily used by the builder in connection with the alteration or repair of a building, and the extent of the proposed occupation.

3.—If a water service is requested, and size of same.

4.—If a drain is to be laid from street sewer to the line of lot on which said building is to be erected, the level of said drain to be obtained from the department.

5.—The quantities of mason, brick, and plaster work on which to base the charges for water. The said party or parties shall submit for examination by the inspector, full plans and specifications for the building proposed to be erected, repaired or altered, and said plans and specifications shall be sufficient to enable the inspector to obtain full and complete information as to the character and extent of the work to be done. Should the plans and specifications so submitted conform to the provisions of this by-law, the inspector shall issue a permit for such erection, alteration, or repair, and shall identify by a stamp or seal, with the date, for future reference, the said plans and specifications, and they shall, after such identification, be returned to the applicant, who must produce such plans and specifications, when required to do so, for the purpose of comparing them with the building as carried out. The plans and specifications submitted to the inspector, as described in this section, shall show the proposed drainage and plumbing work, and description of the same, and said plans and specifications shall be submitted by the building inspector to the health department for examination by the engineer of that department, and he shall obtain his approval and endorsation on the plans and specifications for such drainage and plumbing work.

SECTION 23.—No permit shall be granted for the erection of any dwelling house or building where people congregate, unless drainage connection can be made directly with a public sewer. If the matter mentioned in any application for a permit, or if the plans and specifications accompanying it, indicate to the inspector, and the engineer of health department, that the work to be done is not in conformity with the terms of this by-law, inspector shall refuse to issue a permit, until such application, plans and specifications have been made to conform to the requirements of this by-law.

SECTION 24.—After a permit has been issued upon an application, plans and specifications approved by the inspector, no alterations shall be made in such plans or specifications as will reduce the strength of any portion of the building, or injuriously affect the sanitation of the same.

In case any change is made in any building or premises, or in any erection for which a certificate has been issued, or which has had the approval of the inspector under this by-law, whether in the use thereof or otherwise, such as would annul the terms or conditions of such certificate or approval, such change must be notified at once to the inspector.

SCHEDULE OF FEES FOR PERMITS.

STREET LINES, USE OF STREETS, WATER, ETC.

SECTION 25.—The fees to be paid for permits for the erection or alteration of buildings shall be as follows:

For sheds not exceeding 256 square feet in area..... $1.00
For buildings one story in height and not exceeding 1,000 square feet in area..... $1.50

For buildings more than one story in height and larger in area than 1,000 square feet, the permit shall be at the rate of ten cents for every 1,000 cubic feet or fractional part thereof contained in said structure, the cubic contents being ascertained by measuring every part of the building from the basement floor to the top of roof and to include all bay windows or other projections.

The fees to be paid for the use of streets shall be in proportion to the frontage occupied, and shall be at the rate of two cents per month per foot frontage of street so occupied.

The fees to be paid for obtaining a street line or level shall be, for every such line or level..... $1.00

The fees to be paid for water used in the construction of a building shall be as follows:

For every 1,000 bricks used in said building..... 6 cents
For every cubic yard of masonry, concrete or terra cotta 2 cents
For every one hundred superficial yards of plastering... 30 cents

GENERAL PROVISION.

SECTION 26.—Every wall, structure or building hereafter built or altered in the said city shall conform to the provisions of this by-law, except temporary or moveable buildings, elevators, coal chutes, as mentioned in this by-law. Plans for any building not provided for in this by-law must receive the sanction of the city council before commencing operations thereon.

MEANING OF TERMS.

SECTION 27.—In this by-law the following terms shall have the meanings respectively assigned to them:

"FIRST CLASS BUILDINGS".—Mean buildings of fire-proof construction throughout.

"SECOND CLASS BUILDINGS"—Mean all buildings of which the external and party walls are of brick or stone, or other equally substantial and incombustible material.

"THIRD CLASS BUILDINGS"—Mean all buildings such as are described in section 32 of this by-law.

"ALTERATION"—Means any change or addition (except necessary repairs) to or upon any building, which affects any external party or partition wall, chimney, floor or stairway, or in any manner endangering life, or causing additional fire risk.

"APARTMENT OR TENEMENT HOUSE"—Means a building any portion of which is occupied, or intended to be occupied, as a dwelling by two or more families living independently of one another, and either doing their cooking in their own rooms or upon the premises.

"CELLAR"—Means the basement or lower storey which is wholly below the level of the street or of which half or more of the height from the floor to the ceiling is below the level of the street adjoining.

"FOUNDATION"—Means that portion of a wall below the level of the street curb, and, where the wall is not on a street, that portion of it below the highest ground next to the wall. The foundation of a party wall may mean that portion below the level of the cellar floor.

"HEIGHT OF BUILDING"—Means the perpendicular distance of the highest point of the main roof above the highest street level of the principal front.

"HEIGHT OF WALL"—Means the height from the mean grade of the sidewalk or adjoining ground to the highest point of the wall.

"INSPECTOR"—Means the Inspector of Buildings for the city of Montreal.

"LODGING HOUSE"—Means a building in which persons are temporarily accommodated with sleeping apartments, and includes hotels.

"PARTY WALL"—Means a wall used or built in order to be used as a separation between any two buildings.

"PARTITION WALL"—Means any internal wall built of stone or brick or other incombustible material.

"EXTERNAL WALL"—Means every outer wall or vertical enclosure of a building other than a party wall.

"REPAIRS"—Means the reconstruction or removal of any existing part of a building, or of its fixtures or appurtenances, by which the strength or fire risk is not affected or modified, and not made, in the opinion of the inspector, for the purpose of converting the building in whole or in part to a new one.

"WOODEN BUILDING"—Means buildings made of wood, and applies to all buildings made of wood, the outside of which is veneered with brick or terra cotta.

"THICKNESS"—Means the minimum thickness of any wall.

"THEATRE"—Means any building having a stage with fixed and moveable scenery, fire-proof curtain, and machinery to be used for dramatic, operatic, or other similar purposes.

"PUBLIC BUILDINGS"—Means churches, chapels, seminaries, colleges, convents, schoolhouses, hospitals and asylums, hotels, theatres, halls for public meetings, government and municipal buildings, etc.

"OWNER"—Means every person in possession of any land or building in the said city, or in receipt either of the whole or any part of the rents or profits thereof, or in the occupation of such land or building, other than as a tenant from year to year, or for any less term, or as a tenant at will.

"BUILDER"—Means the master builder or contractor employed to execute any work upon any building.

"COUNCIL"—Means the Council of the city of Montreal.

"PERSON"—Shall include a company, or a body corporate.

BUILDING LIMITS.

SECTION 28.—The city council may, from time to time, by resolution, establish and extend limits within the city, and within these limits every building erected after the passing of this by-law shall be of the first or second class, with the following exceptions:

EXCEPTIONS (TEMPORARY SHEDS).

(a.) Temporary sheds made of wood for the use of workmen or storage of materials in connection with the erection of buildings of the first and second class.

SHEDS USED AS OUTBUILDINGS.

(b.) Sheds used as outbuildings for buildings of the first, second and third class, provided that the roof is covered with fire-proof material, that the sides or ends which are closed are cased with brick or other incombustible material, that the said shed is not over 300 feet in area and not more than 15 feet high to top of roof, and that it is supported on a stone foundation or on stone piers.

BUILDING FRONTAGE LINES AND HEIGHT OF BUILDINGS.

SECTION 29.—The council may fix and from time to time determine streets on which a line shall be fixed, at such distance from the line of said street as may be determined on by said council, and beyond which line no building shall hereafter be erected. The council may also fix and determine streets in which it shall not be lawful, after such determination by said council, to erect any building unless the said building is three storeys or more in height, and that it is constructed of stone or other material approved of by the council, but no building, in any street in the city, shall exceed ten storeys in height above the sidewalk or street level, or be more than 130 feet from level of sidewalk to the roof.

EXTENSION, REPIAR, ERECTION AND CASING OF WOODEN BUILDINGS.

SECTION 30.—No wooden building erected previous to the passing of this by-law, shall be extended or built upon, unless such extention, or addition be made of fire proof material, nor unless the owner of said building shall have previously obtained a certificate from the inspector to the effect that the proposed extension or addition can be made with safety.

No wooden building already existing, and not cased with brick, shall be removed from one lot to another, nor from one portion of a lot to another portion of the same lot.

SECTION 31.—It shall be unlawful to repair any wooden building not cased with brick, erected previous to the passing of this by-law, when such building shall have been damaged by fire or by natural decay to the extent of forty per cent of its value; the decision of the inspector shall be conclusive as to the amount of damage to said building, but the owner shall have the right to appeal from said decision in the manner prescribed in section 15 of this by-law.

SECTION 32.—Third-class buildings may be erected within the limits prescribed by the city council, provided:—

1st.—That the external walls of said buildings are made with three inches thick grooved and tongued sound plank, so braced and framed and joined together as to be solid and rigid.

2nd.—That the said building shall not exceed thirty feet in height above the average level of the sidewalk to the highest

point of the roof, and no more than 2 storeys, shall be in wood, with a mansard roof.

3rd.—That the walls of said building shall be cased with brick-work not less than four inches thick, or with stone not less than 6 inches thick, laid in Portland cement, and in each case properly secured to the wood work.

SECTION 33.—Any wooden building which may hereafter be erected contrary to the provisions of this by-law, shall be deemed a nuisance, and it shall be the duty of the inspector to give notice to the owner or builder of said building, to abate such nuisance, and in the event of the owner or builder failing to do so within 24 hours, the inspector may cause such building to be demolished, and the expenses incurred in doing so may be collected from the said owner or builder, before the court having jurisdiction in the matter.

SECTION 34.—No terrace or row of brick cased wooden buildings shall be erected, unless the same is divided by cross walls of brick work at intervals of not more than 30 feet; the said cross walls shall rest upon continuous stone foundations, and shall be not less than eight inches thick, where the building is only one or two storeys in height. If the building is three storeys in height, the cross walls shall be twelve inches thick in the first storey, and eight inches thick for the balance of the height; the said cross walls shall extend one foot above the roof as provided for in section 65, of this by-law. They shall also extend to the outside face of the front and rear wood walls and be tied to or connected with the four inches brick casing.

SECTION 35.—A wooden building erected in compliance with section 32 of this by-law, shall be encased with brick as soon as practicable after erection. Should the owner or builder fail to do so within ten days after being notified by the inspector to build such casing, the said building shall be deemed a nuisance, and shall be subject to the provisions of section 33 of this by-law.

SHEDS CONSTRUCTED OF WOOD.

Sheds not exceeding twelve feet in height at the peak or higheet part thereof, may be constructed of wood, in rear of third-class buildings; provided the roof of such sheds be covered with incombustible materials, and provided also that the term "Sheds." be so construed as to mean a structure with a roof sloping one way with one of its sides entirely and constantly open, and such open side to be at least elght feet from any other structure.

TEMPORARY SUPPORTS.

SECTION 36.—Temporary supports placed under any structure, wall, girder, or column, during the erection, alteration or repairing, of any building, or portion thereof, shall be amply sufficient to bear the load, and equal in strength to the permanent support, or supports of said construction.

The walls of any building in course of erection shall be strongly braced from the beams of each storey until the bearing parts of the construction are completed.

SCAFFOLDS.

SECTION 37.—Any scaffold erected for the use of workmen engaged upon the erection, repair, or alteration of any building or structure, shall be so made and constructed as to safely bear the loads imposed upon it, and to afford ample protection to life and limb.

QUALITY OF MATERIALS.

SECTION 38.—All materials of whatsoever kind shall be of good quality, and sufficient in every respect for the purposes for which they are to be used, and to conform to the best legal trade, and manufacturers' standard, and to be subject to the approval of the inspector.

BRICKS.—The bricks used in all buildings shall be good, hard, well burnt bricks.

BRICKWORK.—Walls and piers of all buildings shall be properly bonded with row of headers, at least every fifth course of brickwork or equivalent thereto, and solidly put together with close joints filled with mortar. They shall be built to a line and be carried up plumb and straight. The walls of each storey shall be built up the full thickness to the top of joists above. All brick laid in non-freezing weather shall be well wet, immediately before being laid. Walls and piers or parts of walls and piers, if frozen, shall not be built upon.

SAND.—The sand used for mortar shall be clean, sharp sand, and shall be equal to the standard samples kept in the office of the inspector.

MORTARS.—Cement mortars shall be made of sand and cement in the proportion of not more than three parts of sand to one part of cement approved by the inspector, and used immediately after being mixed. Lime mortar shall be made of not more than four parts of sand to one of lime, for stone work, and three parts of sand to one of lime, for brick work, and shall not be used before being thoroughly slaked. All cement to be of a brand approved by the inspector.

CONCRETE.—Concrete for foundations, etc., shall be made of one part of cement, two parts of sand, and five parts of small clean broken stone, all carefully mixed, or one half of the five parts may be clean gravel, and the other half small broken stone.

TIMBER.—All timbers and wooden joists and beams used in any building shall be of good sound material, free from rot, large and loose knots, shakes, or any imperfection, whereby the strength may be impaired, and be of such size and dimensions as the purpose for which the building is intended may require, and according to the rules given in the works of the best recognized authorities.

FOUNDATIONS FOR BUILDINGS.

SECTION 39.—Every building hereafter erected, except those of a temporary character, as herein provided for, shall have foundations of stone or hard weather proof brick, approved by the inspector, the bottoms of which shall be laid a depth of not less than four feet six inches below the surface of the ground at all points, and shall be laid upon solid ground or level surface of solid rock, or upon piles, or concrete, or other solid structure.

If brick as above mentioned is used, it must be laid in Portland cement.

SECTION 40.—In case the nature of the earth requires it, foundations are to be made by driving piles; where piles are used, they are to be of sound timber not less than five inches in diameter at the small end, and are to be driven to a firm and solid bearing. There shall be not less than two rows of piles below any external or party wall, and they shall not be spaced at a greater distance apart than three feet from centre to centre, in the direction of the length of the wall.

A single row of piling may be placed below an internal wall, provided that it is not over twenty feet in height, and that such piling is approved of by the inspector.

The heads of piles are in all cases to be cut off two inches below the level of the bottom of the footing, and are to be encased in cement concrete, of not less than nine inches in thickness, this concrete to extend not less than eight inches beyond the outer face of piles on each side.

In no case shall an excavation for a basement or cellar be made on either side of a wall supported on piles, so as to expose the piles; such excavation shall terminate at least six inches above the bottom of the footing resting on the piles or of the concrete in which they are imbedded.

SECTION 41.—Where the nature of the earth requires a wider sub-structure than can be obtained with stone, the sub-structure may, in the case of buildings of the third class, or of buildings of the second class, which do not exceed two stories in height, be made of hemlock, or tamarac timbers, bedded on the earth, the size and disposition of these timbers to be subject to the approval of the inspector.

SECTION 42.—If steel or iron beams are used for the sub-structure of any building, they must be thoroughly imbedded in cement concrete, the concrete, to be entirely free from cavities, and to thoroughly envelope the beams; the exposed surfaces of such concrete foundations to be coated with cement mortar not less than one inch thick.

The cement used for all concrete in foundations must be of a standard approved of by the inspector, and shall have a tensite strength of 350 lbs. per square inch, after being immersed seven days in water. When the inspector shall have reason to doubt the quality of the cement, and that it is not equal to the standard fixed, he shall have the right to order the contractor to have the same tested by a proper and responsible party, at the contractor's expense, and to submit the signed certificate of the test to him.

Substructures made with steel or iron beams and concrete, must be so adjusted that the fibre strain upon the metal, if of iron, shall not exceed 12,000 lbs., and if of steel, 16,000 lbs. per square inch.

SECTION 43.—Where the nature of the earth admits of it, sub-structures may be made wholly of concrete. Such concrete foundations to be made with standard cement, as prescribed in the preceding section, and shall not be less than twelve inches in thickness, and not less than 6 inches wider on each side than the bottom course of stone or brick footings resting upon it.

FOOTING COURSES FOR FOUNDATION WALLS.

SECTION 44.—Below all foundation walls, piers, columns, posts and pillars resting upon earth, rock, piles, or concrete, a base or footing course of stone or brick shall be laid; below foundation walls of buildings of the third-class or the foundations of buildings of the second class which do not exceed thirty-five feet in height, the footings, shall be of stone not less than eight inches in thickness, and be at least twelve inches wider than the bottom width of the wall.

In buildings of the second class exceeding thirty-five feet in height, and in all buildings of the first class, the stone footings shall be in two or more courses, proportioned to the wall which they are to carry, each course to be not less than twelve inches in thickness, and project not less than six inches on each side of the bottom of the wall, or of the course immediately above it.

SECTION 45.—If stepped up footings of brick are used in place of stone steps, or off-sets, if laid in single courses, shall each not exceed one and one-half inches, or if laid in double courses, shall not exceed three inches.

All bricks used for substructures shall be of such quality as to resist the action of frost and damp, and in all cases must be laid in Portland cement of a brand approved of by the city inspector, who may require a test to be made as provided in section 42.

SECTION 46.—Below any column or post in the basement or cellar of a building, there shall be a base stone proportioned in size to the load carried by the column or post, and below the base stone, there shall be at least one footing projecting not less than twelve inches on each side of the base stone. Should the load require it, there shall be two or more footings proportioned to the weight to be borne and the nature of the soil in which they rest.

SECTION 47.—Below all brick or stone piers there shall be footings of stone or brick, the area of which shall be proportioned to the load which the pier has to support, but in no case shall such footing have a projection of less than twelve inches on each side of said pier; the footing, if of stone, to be in two or more courses, each course projecting not less than six inches on each side beyond the course immediately above it; if the footings are in brick, they are to be stepped as described in section 45.

DAMP COURSE.

SECTION 48.—If any house or building, to be occupied partially or wholly as a dwelling, is to be erected upon any site, or portion of a site, which is damp, swampy, or which has been filled up or covered with any material impregnated or mixed with any foecal, animal, or vegetable matter, or which shall have been covered with dust, or slop, or other refuse, the whole area of said house or building shall be covered with a layer of good concrete at least four inches thick, finished smooth on the surface with cement or other impervious material.

FOUNDATION WALLS.

SECTION 49.—Foundations for external, party or internal walls, built wholly of rubble masonry, shall be thoroughly bonded together by through stones or headers, extending not less than three-fourths of the full thickness of the wall, and all the stones of said wall shall be solidly bedded, and all joints flushed up solid with mortar or cement, and the said wall shall be built straight and plumb on both sides.

SECTION 50.—Foundation walls, built of rubble masonry, for buildings of the second class to be used as dwellings, or as shops on the ground storey with dwellings over, and where the superstructure is of brick not exceeding forty feet in height, shall not be less than twenty-four (24) inches in thickness, and this thickness shall be increased four inches for each fifteen (15) feet or fraction thereof added to the height of the building.

If the superstructure is of stone not exceeding forty feet in height, the thickness of the foundation wall shall not be less than twenty-six inches, and the thickness of said foundation shall increase four inches for each fifteen feet, or fraction thereof, added to the height.

SECTION 51.—Foundation walls built of rubble masonry for buildings of the second class, intended to be used as warehouses, factories, churches, school houses and public buildings and where the superstructure, whether in stone or brick, does not exceed forty (40) feet in height, shall not be less than twenty-seven inches in thickness, the thickness to be increased four (4) inches for each additional 12 feet or fraction thereof, added to the height.

SECTION 52.—Foundation walls, when of stone, for buildings of the first class, over seventy-five (75) feet in height, shall be block stone laid in cement, the thickness and width of the same to be proportioned to the height of the building.

SECTION 53.—Foundation walls, when of stone, for buildings of the first class under seventy-five feet in height, or of the second class, where the superstructure is sixty (60) feet or over in height, shall be composed of large flat bedded stones, one-third of which shall extend the full thickness of the wall.

SECTION 54.—Foundation walls, if made of brick, shall be at least four inches greater in thickness than the wall immediately above them, and shall be built with hard burned weather proof bricks laid in Portland cement, but in no case shall such foundation wall be less than twenty (20) inches thick.

SECTION 55.—In all cases, foundation walls whether of brick or stone, shall be thick enough to resist lateral pressure, and the inspector may order an increase in thickness, or the addition of piers or buttresses to a foundation wall to resist such pressure.

SECTION 56.—In all cases where foundation walls are exposed to a flow of water, they shall be built with Portland cement, or if built with lime mortar, shall be plastered on the side exposed to water, with Portland cement or asphalt, in such manner as will render the wall impervious to water.

EXTERNAL AND PARTY WALLS.

SECTION 57.—The external walls of buildings, built either of rubble masonry or brickwork, and faced on the outside with coursers, ashler, or other cut stone, shall have coursers, ashler, or other cut stone thoroughly bonded or tied to the stone or brick backing, with bond stones or heavy metal cramps, extending to not less than three-fourths of the thickness of the wall from the face, and placed not more than three feet apart in any direction.

SECTION 58.—The minimum thickness of brick external and party walls above the foundation walls, for buildings of the first and second class, shall be as follows:—

For all buildings used as business premises, warehouses, manufactories and public buildings:—

TABLE NO. 1.

	Basement.	Ground Floor.	1st	2	3	4	5	6	7	8	9	10
One storey	12	12										
Two storeys	16	12	12									
Three "	16	16	12	12								
Four "	20	16	12	12	12							
Five "	24	20	16	16	12	12						
Six "	24	20	20	16	16	16	12					
Seven "	28	24	20	20	16	16	12	12				
Eight "	28	24	20	20	20	16	16	16	12			
Nine "	28	24	24	20	20	20	16	16	16	12		
Ten "	32	28	24	24	20	20	20	16	16	16	12	
Eleven "	36	28	28	24	24	20	20	20	16	16	16	12

For buildings where the first storey is used for business purposes and the upper storeys as dwellings:—

TABLE NO. 2.

	Basement.	Ground Floor.	1st	2	3	4	5	6	7	8	9	10
Two storeys	16	12	8									
Three "	16	12	12	8								
Four "	20	16	12	12	12							
Five "	20	16	16	12	12	12						
Six "	20	20	16	16	12	12	12					
Seven "	24	20	20	16	16	12	12	12				
Eight "	24	24	20	20	16	16	12	12	12			
Nine "	28	24	20	20	20	16	16	12	12	12		
Ten "	28	24	24	20	20	20	16	16	12	12	12	
Eleven "	32	28	24	24	20	20	16	16	16	12	12	12

For buildings used as dwelling houses:—

TABLE NO. 3.

	Basement.	Ground Floor.	1	2	3	4	5	6	7
One storey	12	8							
Two storeys	16	12	8						
Three "	16	12	12	8					
Four "	16	16	12	12	12				
Five "	20	16	16	12	12	12			
Six "	20	16	16	16	12	12	12		
Seven "	24	20	16	16	16	12	12	12	
Eight "	24	20	20	16	16	16	12	12	12

SECTION 59.—The thickness of external or party walls, when built of rubble masonry, shall be seventy-five per cent. in excess of the thickness for brick walls mentioned in the preceding tables, but in no case shall a stone wall be less than twenty inches in thickness.

In any external wall built of brick and faced with stone, ashler, or courses, the said ashler or courses shall be considered as equal to four inches of brickwork, in estimating the thickness of the wall.

SECTION 60.—In all buildings, fifty feet in width in which the external walls are not buttressed or supported by brick partition walls, or by girders running at right angles to the wall and resting upon it, they shall be increased four inches in thickness greater than mentioned in the preceding tables, and for every additional fifty feet or fraction thereof in width of said building unsupported by brick partition walls or girders, there shall be an additional increase of four inches in the thickness of said wall.

SECTION 61.—External or party walls, one hundred feet or over in length, which are not strengthened by cross walls or buttresses equal in height to the wall, shall be four inches thicker than mentioned in the preceding tables.

DIVISION OF BUILDINGS BY BRICK PARTITION WALLS.

SECTION 62.—All second class buildings, hereafter built, shall be so divided by brick partition walls, of the thickness prescribed in the preceding tables, that no space inside of such building shall exceed in area ten thousand square feet; all such partition walls shall be carried not less than twelve inches above the roof at every point.

No existing wall in any second class building shall be removed so as to leave an area not enclosed with brick-walls of more than ten thousand superficial feet.

STRENGTHENING WALLS BY PIERS OR BUTTRESSES.

SECTION 63.—The external walls of business premises, manufactories, and warehouses, in which the area of the openings is equal to sixty per cent. or over of the face of the wall, and where the wall is not supported by brick cross or partition walls, at intervals of twenty-five feet or under, the same shall be reinforced by piers or buttresses, or shall be increased in thickness.

SECTION 64.—If any storey in any building of the first or second class, used as a dwelling, exceeds in height sixteen times the thickness prescribed in the preceding table No. 3, of Section 58, the thickness of such external or party wall throughout such storey, shall be increased to one sixteenth part of the height of the storey, and in buildings used for warehouses and manufactories, the increase shall be in the proportion of one-fourteenth part of the height of the storey, but such additional thickness may be confined to piers properly distributed, of which the collective widths shall amount to one fourth part of the length of the wall.

PARTY WALLS.

SECTION 65.—Every party wall shall be built through and to at least one foot above, and distant from the roof boarding at every part of roof, and shall rise to the same height above any skylight, hatch, or other construction on the roof, which is contiguous to the wall.

SECTION 66.—Every party wall shall be corbelled to the outer edge of all eaves, or other projections, with brick, stone, or other incombustible materials, in such manner as approved, and as will effectually prevent fire from being carried from one building to another, by the eaves or cornices.

SECTION 67.—In no case shall a party wall, above the ceiling of the upper storey in a dwelling house, be less than eight inches in thickness, and in warehouses, manufactories or business premises, less than twelve inches.

SECTION 68.—The top of all party or other walls, projecting above a roof, shall be covered with incombustible material.

SECTION 69.—Openings in party walls, or in partition walls described in sections Nos. 62 and 65, shall not exceed two in number in any storey, and the combined area of such opening in each floor shall not exceed one hundred and forty superficial feet.

SECTION 70.—All such openings in party or partition walls, shall be fitted with wood doors, entirely covered with bright tin, or fitted with two iron doors, one placed on each side of the wall, said doors to be made of sheet iron not less than No. 16 guage, properly riveted to iron frames of suitable size. The said doors, whether of wood covered with tin, or wholly of iron, are to be hinged to suitable frames, firmly fixed to the wall, or they are to slide on suitable pulleys and hangers, all as prescribed by the rules of the Fire Underwriter Association.

SECTION 71.—Roof or floor timbers entering opposite sides of a party wall, shall have at least four inches of solid brickwork between the ends of said timbers.

SECTION 72.—No recess shall be made in any party wall which is only eight inches thick, and in no case shall a recess be made of more than four inches in depth in any party wall which is twelve inches thick, nor more than eight inches in depth in any wall that is sixteen inches or over in thickness.

No such recess shall be over six feet in width and in all cases such recesses must be made vertical.

Should it be necessary to make recesses of greater depth than above mentioned, or should it be necessary to make them diagonally across the wall, they can only be so made by consent of the inspector.

The aggregate area of recesses in any wall shall not exceed one-fourth of the whole area of the face of the wall, on any storey, nor shall any recess be made within a distance of 6 feet from any other one in the same wall, without the approval of the building inspector.

SECTION 73.—In all party or division walls in buildings used as business premises, manufactories, or warehouses, and in all public buildings, the walls shall be corbelled on each side not less than three inches, to receive the floor joists, said corbelling not to be less in height than four courses.

SECTION 74.—In the case of buildings expropriated by the corporation for the widening of streets, or when from any other cause it is necessary to remove one-third of the depth of any existing building, the party wall of the remaining portion of said building, if not already built in conformity with this by-law, shall be demolished throughout its whole extent, and rebuilt in compliance with the provisions of the said by-law.

And should the remaining portion of said building other than the party wall not be in accordance with this by-law, it shall be demolished, and if rebuilt it shall be built in conformity with the provisions of this by-law.

HOLLOW WALLS AND WALLS LINED WITH POROUS TERRA COTTA.

SECTION 75.—External walls may be built hollow, provided the said walls contain not less than sixteen inches in thickness of solid brick, say eight inches of solid brick on each side of an air space, or with twelve inches on the outside and four inches of solid brick work on the inside of an air space; the walls on each side of the air space are in all cases to be securely tied together with brick or metal ties, placed not more than two feet apart.

SECTION 76.—External or party walls lined on the inside with porous terra cotta shall be of the thickness prescribed by this by-law, exclusive of the thickness of the terra cotta. In all cases where a wall is lined with terra cotta, the terra cotta is to be firmly secured to the solid wall by headers of brick or terra cotta, or by iron cramps, placed not more than two feet apart.

PIERS OR COLUMNS SUPPORTING WALLS.

SECTION 77.—When any external wall or portion thereof is supported on piers, columns, or pillars, such pier, column, or pillar shall be of stone, brick, steel, iron, or other incombustible material, and of sufficient size and strength to safely carry the load upon them. Should the piers be of brick, and less than nine square feet in area, they shall be capped with a stone not less than six inches thick, or an iron plate not less than 1½ inches thick, and the full size of the piers; said piers, if over six feet in height, shall have bond stones of the full size of the pier built into them at intervals of not over three feet apart; should the piers front on a street, the bond stones may conform to the kind of stone used for the trimmings of the front.

SECTION 78.—Any column or pillar of metal, supporting an external wall or portion thereof, shall rest upon a dressed stone base not less than twelve inches thick, or upon an iron plate and stone base combined, and the said base shall be of such dimensions as will safely support the column and wall resting upon it; the said column or columns, if supporting a wall twenty inches or over in thickness, shall be either constructed double, that is, an outer and inner column, the two combined to be of sufficient strength to sustain safely the weight to be imposed thereon, or such other iron or steel column of sufficient strength, and so protected as to secure resistance to fire.

METAL COLUMNS SUPPORTING BEAMS OR INTERNAL WALLS.

SECTION 79.—Iron or steel columns supporting beams or girders, elsewhere than in external walls, shall rest upon stone blocks or iron plates of sufficient size and thickness to properly distribute the load upon the wall on which the column rests; if the load is to be distributed directly on the ground, footings of stone are to be made below the column, as provided for in section No. 46.

Cast iron columns set one above the other shall have proper flanged connections, and bolted together; all bearing parts of columns or plates shall be planed or turned to true surfaces; no cast iron post or column of less thickness than ¾ of an inch shall be used in any building.

Cast iron posts or columns used for the support of wood or iron girders or brick walls, which are not cast open on one face shall, before being set up in place, have a hole ¾ of an inch in diameter drilled in the shaft by the manufacturer or contractor furnishing the same, to exhibit the thickness of the metal. The inspector may order additional test holes to be drilled where he may direct.

Iron posts or columns cast with one or more open sides or backs, shall have solid iron plates on top of each, to prevent the passage of fire or smoke through them from one story to another, except where pierced for the passage of pipes.

No cast or wrought iron post or column shall have an unsupported length of more than thirty times its least lateral dimension or diameter.

The maker of all steel or cast iron columns shall be obliged to stamp the same with his name and the carrying capacity of each of them.

WOOD POSTS NOT TO BE USED FOR SUPPORT OF A WALL.

SECTION 80.—In no case shall a wood post or column be used for the support of any wall in a building of the first or second class (except as a temporary support), nor shall any metal column or post rest upon a wood post or beam.

STEEL OR IRON BRESSUMER AND LINTELS.

SECTION 81.—Openings in an external wall over which a wall has to be carried, and which are too wide to be linteled with stone or spanned by an arch in brick or stone of sufficient strength to carry the superimposed load, shall be spanned by a bressumer or lintel of steel or iron, and such bressumer or lintel shall be so proportioned to the load which it has to bear, that the maximum fibre stress will not exceed 16,000 lbs. for steel or 12,000 lbs. for iron, per square inch. Steel or iron lintels used to span any opening in any external or internal wall more than ten feet in width, shall, if resting at the ends upon stone or brick walls, columns or piers, have a bearing of at least ten inches, by the thickness of the wall to be supported, and if resting upon an iron or steel post, or column, the bearing shall not be less than six inches by the thickness of the wall to be supported.

In all cases where an iron or steel bressumer or lintel is supported on brick walls or piers, it shall rest at each end upon a stone block or iron plate properly proportioned to transmit the load to the wall or pier.

WOOD FURRINGS ON WALLS.

SECTION 82.—In all buildings of the second class used for churches, schools, theatres, hotels, warehouses, manufactories or places of public assembly, external or party walls shall not be furred with wood or other combustible materials.

In all other buildings of the second class, if wood or other combustible material is used for furring on external or party walls, the stone or brick of which these walls are composed, shall, immediately above each tier of joists, project from the face of the wall equal to the projection of the furring for a height of at least ten inches above the joists, and the coarse of brick immediately below the under side of the floor joists shall also project the thickness of the furring.

WOOD LINTELS OR BRESSUMERS NOT ALLOWED IN EXTERNAL WALLS.

SECTION 83.—No wood lintel or bressumer shall be used to span any opening in an external wall of a second class building over which a wall has to be carried, except as herein below provided.

Wood lintels may be used to span the inside of an opening in an external wall of a second class building, provided that the opening is not over five feet in width, and that the lintel has a depth of 1¼-inch for each foot in width of the opening. Wood lintels shall not be used to span the inside of openings in external walls, if such openings are placed so close together as not to admit of at least 12 inches in width of stone or brick being between the ends of the lintels.

Wood lintels may be used to span openings in internal walls (except party walls), over which a wall has to be carried, provided that the opening does not exceed six feet in span, and that the lintel is 1¼-inch in depth for each foot in width of the opening, by the thickness of the wall to be supported.

Wherever practicable, relieving arches in brick or stone are to be turned over wood lintels.

CHIMNEYS.

SECTION 84.—All chimneys and smoke flues shall be built of stone, brick or other incombustible material.

Smoke flues built of brick shall not be less than one hundred and twenty-eight square inches in area, and the walls around the flue shall not be less than eight inches thick, except that the wall between one flue and another may be four inches thick.

Smoke flues lined on the interior with fire clay pipes shall, if in brickwork, be surrounded by walls not less than four inches thick at any point, and if in stonework, by walls not less than eight inches thick; the internal diameter of such flue lining shall not be less than nine inches.

Smoke flues, if made in stonework, shall be lined on the inside with brickwork four inches thick, or with fire clay pipe linings.

The top of any chimney shall not be less above the roof of the building of which it forms part, than four feet, if said roof is a flat roof, and not less that two feet above the ridge of the roof, if said roof is pitched.

The top of every chimney shall be covered with iron, stone or other incombustible material, and said covering shall be securely fastened to the chimney.

No chimney shall be corbelled more than four inches from a wall twelve inches thick, nor more than eight inches from a wall sixteen inches or over in thickness; no chimney or flue shall be corbelled from a wall eight inches thick.

Chimneys may rest upon steel or iron beams, provided the said beams are properly supported on stone or brick walls, or piers, or on iron columns, and that the fibre strain upon the iron or steel beams does not exceed the limit mentioned in section 81 of this by-law.

In no case shall a chimney or smoke flue rest upon, or be supported by wood.

Any chimney, not forming part of a wall of a building, shall rest upon the ground on proper foundations, proportioned to the size and height of a chimney.

Any chimney with a flue of greater area than 400, and less than 784 square inches, which is connected with the external party or brick partition wall, and which does not exceed seventy feet in height, shall have walls not less than twelve inches thick for a height of fifty feet; the balance of the height may be eight inches thick.

If the height of the flue exceeds seventy feet, the first twenty-five feet in height shall have walls not less than sixteen inches thick; the balance of the height may be twelve and eight inches, as above described.

If the said flue is used in connection with a steam boiler or a furnace, which heats it to a high temperature, it shall be lined from the bottom of the entrance of the smoke flue, and for a height of not less than fifteen feet above the same, with fire brick.

Any chimney having a flue of 784 square inches or over in area, and whether connected with the walls of a building, or isolated therefrom, shall have hollow walls for a height of not less than two-thirds of the whole height of the chimney, and they shall be designed and constructed so that the stress due to the weight of the stack, and from wind pressure, shall not exceed the limit fixed by this by-law, as the maximum stress to be allowed for brickwork; the said flue shall be lined with fire brick for a height proportioned to the whole height of the chimney, and to the heat it has to endure, but in no case shall the height of said fire brick be less than twenty-five feet, the lining of fire brick to be independent of the walls of chimney.

The foundations for chimneys of the size above mentioned shall be built in conformity with the provisions of this by-law respecting foundations.

No metallic chimney, not enclosed in brick work and used in connection with a steam boiler or a furnace which heats the flue to a high temperature, shall be erected, unless it is entirely isolated from any woodwork, and then only with the consent of and in the manner prescribed by the inspector, and the inside of said flue shall be lined with fire brick to such height as directed by the inspector.

The proprietor of any house or building hereafter to be erected in this city, the chimney of which shall not be more than one foot horizontally distant from any other building having a higher elevation, shall be bound at his own expense to raise the height of such chimney to be erected, as aforesaid, above apex or roof of the said house or building, but in the event of the lower building having been constructed previously to the more elevated one, then the proprietor of the more elevated building shall, at his own expense, and with due diligence, raise the said chimney of the lower building to the height of his own chimney, or incorporate the flues in his own wall.

CHIMNEYS EMITTING SMOKE DECLARED A NUISANCE.

SECTION 85.—Any chimney emitting smoke so as to cause damage to or injuriously affect neighboring properties or the oc-

cupants of the same, shall be deemed a nuisance, and any person who shall commit such nuisance, or permit the same to be committed, or shall neglect or refuse to abate the nuisance after being notified to do so, shall be liable for the penalty prescribed in section 169 of this by-law.

HEARTHS AND FIRE PLACES.

SECTION 86.—The hearths of all fire places in buildings of the second and third class shall be supported on trimmer arches of brick or terra cotta, said arches to be not less than four inches thick, and having the crown of the arch not less than two inches below the level of the floor.

Or the hearths of said fire places may be supported on iron bars, placed between and firmly secured to the wood floor joists and trimmers, the top of said bars to be not less than six inches below the level of the floor; on these bars not less than two courses of brick or terra cotta or concrete shall be laid, in mortar or cement, and the joists in the same thoroughly flushed with mortar or cement.

The hearths of fire places, whether of marble, slate, stone or tile, shall be laid upon the trimmer arches or brickwork or cement before described in cement.

All hearths and trimmer arches or brick foundations for hearths of fire places shall be at least twelve inches larger, on each side than the width of the fire place opening and shall be at least eighteen inches wide in front of the chimney breast.

The jambs and backs of all fire places, whether using coal, wood, or gas, as fuel, shall be at least eight inches thick of brickwork; the brickwork over the fire place opening, shall be arched and supported on a cambered iron bar. Fire place openings that are not used, but which have smoke pipes entering into flue of same above the opening, must be closed by means of an iron damper in the throat of fire place opening securely fixed.

The flue from a fire place in which gas only is used as fuel, may be a cast iron or fire clay pipe not less than four inches internal diameter, and such pipe shall be carried out to above the roof, and shall be incased in brickwork not less than four inches thick. If this pipe is not imbedded in a stone or brick or terra cotta wall, then the pipe must be properly encased with asbestos.

HEARTHS BELOW STEAM BOILERS, FURNACES AND RANGES.

SECTION 87.—No steam boiler or furnace for manufacturing purposes, or any range, stove, oven, or boiler used for cooking in a hotel, restraurant, or club house, shall be placed on any floor above the cellar unless the same is set upon steel or iron beams and brick or terra cotta arches, and shall have a hearth of brick or terra cotta laid in cement; said hearth shall extend in front of said range, stove or oven, for a distance of not less than two feet, and at sides and back not less than one foot.

In no case shall such boiler, furnace, range, stove or oven, be used until the same shall have been examined and approved by the inspector, and a certificate obtained.

Any wood floor below a hot water furnace shall be protected by a hearth of brickwork laid in cement or mortar, and said hearth shall extend in front, sides and back of the furnace at least eighteen inches.

COOKING OR HEATING STOVES.

SECTION 88.—Cooking or heating stoves shall be kept clear of any woodwork at least eight inches, unless the woodwork is protected by bright metal shields, in which case the distance shall not be less than six inches. Below all such stoves resting on wood floors there shall be a metal plate, and said plate shall project in front of and all around the stove at least twelve inches.

SMOKE PIPES.

SECTION 89.—No smoke pipe shall project through any external wall or window or roof.

No smoke pipe shall pass through a wood or stud partition, except through a metal ring, built around with brickwork or terra cotta, for a distance of not less than four inches from said ring, or through a double metal collar of the same thickness as the partition, the said collar to have a ventilated air space of not less than two inches around the pipe.

No smoke pipe shall be placed nearer to any woodwork than eight inches, unless such wood is plastered or covered with tin. If the wood, in addition to the plastering, is protected by a metal shield placed two inches distant from the wood, the smoke pipe may be placed within six inches of the wood.

No smoke pipe shall pass through a wooden floor except in a double metal collar, extending the full depth of the joists, floor and ceiling, said collar to have a ventilated air space of not less than two inches around the pipe, and be fitted at the floor and ceiling with metal flanges.

Any smoke pipe from a steam boiler or from a furnace in which the flue is heated to a high temperature shall be kept clear of any woodwork at least twenty inches, and such woodwork must be protected by metal shields in such manner as will render it safe from fire. If the pipe is covered with "asbestos" or other good non-conductor, or if it is made double, with a space of at least one inch between the metal of the two pipes, it may be placed within twelve inches of woodwork, subject to the approval of the inspector.

HOT AIR FURNACES.

SECTION 90.—Hot air furnaces, whether enclosed in brickwork or by metal casings, shall, unless resting directly upon the ground, rest upon hearths not less than four inches thick, made of stone or brick, laid in cement or mortar, and said hearths shall extend not less than two feet in front of the furnace.

Hot air furnaces shall be placed at least eighteen inches from any wooden partition, or from a wood or plaster ceiling, unless the partition or ceiling is protected by a metal shield, in which case the distance shall not be less than one foot.

Cold air boxes connecting with a hot air furnace shall be made of metal for a distance of not less than three feet from the furnace.

Pipes for conveying heated air from a hot air furnace shall be made of bright tin. No hot air pipe shall be carried above the level of the ground floor of any building, unless the same be encased in brickwork or terra cotta not less than four inches thick.

No pipe from a hot air furnace shall pass through a wood or stud partition, except in a metal ring, surrounded with brickwork or other incombustible material, or in a double metal collar as described in section 89.

The openings in floors for hot air registers shall be surrounded with borders of incombustible materials not less than two inches wide, and firmly and securely set in place, and bedded in plaster of Paris.

The register boxes shall be of metal and double, and the space between the two thicknesses of metal shall not be less than one inch.

PIPES AND REGISTERS FOR WARM AIR OF MODERATE TEMPERATURE.

Where air is heated by contact with steam or hot water pipes, or in a furnace which does not heat the air over 100 degrees Fahrenheit, the air may be carried in pipes made of other metal than tin, and the double metal register boxes described in the preceding section may be omitted. Should such pipes pass through a wood or stud partition, they are to be kept clear of the woodwork at least two inches. Hot air furnaces and pipes, registers, etc., in connection with same for heating purposes in dwelling houses or other buildings, shall be so constructed as to avoid any danger of fire, and shall not be used until the inspector's certificate shall have been obtained.

SECTION 91.—All metal pipes conveying steam which have to pass through a wood floor or partition, shall only do so in a metal sleeve or thimble, and there shall be a space of one quarter of an inch between the pipe and thimble.

Steam pipes passing through joists or other timbers shall only do so in a metal sleeve or thimble, and there shall be a space of at least one-fourth of an inch between the pipe and thimble.

SECTION 92.—If a steam pipe passes nearer to a joist or other timber than two inches, the said timber shall be protected by a metal shield or casing, but in no case shall the pipe be nearer to the wood than one-half inch.

FLOORS.

SECTION 93.—The floors in all buildings hereafter erected, or floors in existing buildings which may be renewed, shall be so constructed as to carry safely the weight to which the proposed use of the building will subject them, but the least capacity per superficial square foot, exclusive of the materials in the floor, shall be as follows: For floors of dwellings, 70 pounds; for floors of offices, 100 pounds; for places of public assembly and schools, 125 pounds; warehouses, stores, factories, or buildings for any other manufacturing or commercial purposes, 150 and upwards, according to the use for which they are intended.

STRENGTH OF FLOORS TO BE CALCULATED.

In all warehouses, storehouses, factories, workshops and stores, where heavy materials are kept or stored, or machinery introduced, the weight that each floor will safely sustain upon each superficial foot thereof, shall, within ninety days after the passage of this by-law, be estimated by a competent person employed by the owner or occupant. But if the inspector shall have cause to doubt the correctness of said estimate, he is empowered to revise and correct the same, and for the purpose of each revision, he and

the assistant inspectors may enter any building, and the owner or occupant must remove so much of any floor or other portion thereof as may be required to make necessary measurements and examination.

When the correct estimate of the weight that the floors in any such building will safely sustain, has been ascertained as herein provided, the inspector shall approve the same, and thereupon the owner or occupant of said building, or any portion thereof, shall post a copy of such approved estimate in a conspicuous place on each storey of the building to which it relates.

Before any building hereafter erected is occupied and used, in whole or in part, for any of the purposes aforesaid, and before any building erected prior to the passage of this by-law, but not at such time occupied for any of the aforesaid purposes, the weight that each floor will safely sustain upon each superficial foot thereof, shall be ascertained and posted as hereinbefore required.

No floor joists shall be supported wholly upon wooden partitions, but every joist, except trimmers, shall rest at one end for at least four inches on a wall, or on a girder or beam of suitable size. Trimmers over 4 feet in length, when used in floors calculated to carry 150 lbs. or over per superficial foot, shall be suspended in stirrup irons. When the supporting wall is hollow with a 4" inner lining, the ends of joists must rest not less than 4" on the solid or outer portion of the wall.

All ends of wood in floor and roof joists and beams shall be cut to a level of 3" on their depth.

CUTTING TIMBERS FOR PASSAGE OF PIPES.

SECTION 94.—Cutting of joists or other timbers for the passage of pipes, or other purposes, shall not be done so as to reduce the strength of said timber below that required by the provisions of this by-law.

Each floor of second class buildings shall have its beams or joists so tied to the external walls, by wrought iron straps, of not less than 1½ in. wide by ¾ of an inch thick, placed at not over ten feet apart, and so arranged as to thoroughly tie the walls to the floors.

Where joists or beams do not extend in one piece from wall to wall across, or the depth of a building, they are to be spiked together where the ends lap on each other, or they are to be joined with iron straps not less than the size mentioned in the preceding paragraph, so as to form continuous ties, across or lengthwise of the building, at intervals of not more than ten feet apart.

FLOOR TIMBERS OR STUDDING NEAR FLUES.

SECTION 95.—No floor or roof timber shall be placed closer to any smoke flue than nine inches.

No studding or furring shall be placed within one inch from the outside face of brickwork surrounding any smoke flue.

COVERING AND CONSTRUCTION OF ROOFS.

SECTION 96.—The roof of every building hereafter erected shall be covered with incombustible materials such as tin, iron, slate, copper, gravel, composition, or like substantial roofing material, approved by the inspector.

All new or renewed roofs having a pitch of 30 degrees or over shall be so constructed as to bear safely in addition to the weight of materials a load of 30 lbs. per superficial foot on the surface of said roof, also to resist a horizontal wind pressure of 30 lbs. per foot, in addition to the load above mentioned.

All flat roofs, and roofs having a less pitch than 30 degrees, shall be constructed to bear safely a load of not less than sixty lbs. per superficial foot, in addition to the weight of materials.

Every flat roof shall have a scuttle or bulkhead for access thereto, and the same shall be covered with incombustible materials. In warehouses and factories there shall be a strong iron fixed ladder or stair for access to the scuttle or bulkhead.

SECTION 97.—No saw dust or mill shavings shall be used as a deafening for any floor or roof, except in ice houses and refrigerators.

CORNICES, GUTTERS AND CONDUCTORS.

SECTION 98.—Exterior cornices shall be made of incombustible materials, and in all cases the stone or brick walls behind the cornice shall be carried up solid to the under side of the roof boarding; the said cornice, if made of metal, shall be firmly secured to the walls by iron anchors independent of any wood work.

Where the cornice projects above the roof, the wall shall be carried up to the top of the cornice a minimum thickness of eight inches, and to be covered with incombustible materials.

All existing exterior wooden cornices, which are unsafe or rotten, shall be taken down, or if they are damaged by fire to the extent of one third they shall be taken down, and if replaced they shall be constructed of incombustible materials as above described.

When a wall is finished with a cornice of stone, brick or other heavy materials, the greater weight of mateal in such cornice shall be on the inside of the outside face of the wall, and shall be strongly anchored with metal anchors to the wall.

Any building built on or within three feet of the street line, must shed the water towards the center or rear of the building, or a steep mansard roof may be used, provided the slope is not more than the thickness of the wall and the projection of cornice combined, and must not have any gutters or conductors.

STANDS FOR OBSERVATION.

SECTION 99.—No staging or stand for observation purposes, shall be constructed or occupied upon the roof of any building.

The roof of any building shall not be used as a garden, music stand, or place of public assembly, without the consent of the inspector, and any stand, platform or other structure erected upon a roof shall be made under his instructions.

INSPECTION OF STANDS FOR OBSERVATIONS.

All stands for observation for the public use, either of a temporary or permanent nature, before erection, must have the plans for same submitted to the inspector for his approval, and a permit for same must be obtained. Before being used, said stands must be examined by the inspector, and if found satisfactory, he is to issue a certificate to that effect.

All arches, or similar constructions, erected on any public street or square, must be inspected by the building inspector before being used, and his certificate obtained.

IRON AND FIREPROOF SHUTTERS.

SECTION 100.—Every building which is more than three storeys high above the curb level, occupied for manufacturing or warehousing, shall have doors, blinds or shutters made of iron hung to iron hanging frames, or to iron eyes built into the wall, on every window or other opening above the first storey thereof, excepting on openings fronting on a street twenty feet or over in width, or where no other buildings are within twenty feet.

The fastenings are to be of such character as will allow the shutters to be opened from the outside by firemen. The above requirement shall apply to any opening in any building, which opening is above and within fifteen feet of the roof of another building, or within twenty feet of another opening in an opposite wall, or in a wall the outside face of which diverges at an angle of less than one hundred and twenty-five degrees from the outside face of the wall in which the opening is.

All occupants of the building shall close the said shutters, doors, and blinds at the close of the business of each day.

PROJECTING WINDOWS AND GALLERIES.

SECTION 101.—No bay window or similar structure shall be placed upon any building so as to project over any street, lane or square without the consent of the inspector, but in no case shall such window or structure project more than two feet beyond the street line, and be at least twelve feet above the level of the pavement, nor shall the area of the window or structure projecting over the street line be more than fifteen superficial feet, nor shall there be more than one such projection for each twenty feet of street frontage.

Any balcony or gallery projecting over the line of a square or street, shall be made of or covered with incombustible materials, and shall not project beyond the line of square or street more than three feet, and be at a height above the pavement of not less than twelve feet, and so constructed as to prevent water dropping on the sidewalk.

A balcony or gallery projecting over a common lane, and attached to a building which is under forty-five feet in height from the level of the lane to the top of the wall, may be made of wood, provided that the said balcony or gallery is made open, and does not project more than three feet over the lane, if the lane is sixteen feet or over in width, nor more than two feet if the lane is under sixteen feet in width, nor shall such balcony or gallery be less than twelve feet above the level of the lane.

If a building next a common lane to which an overhanging balcony or gallery is attached is forty-five feet or over in height, from the level of the lane to the top of the wall, then the said balcony or gallery shall be constructed or covered with incombustible material.

The provisions contained in the preceding section are not to be construed as conferring any legal right to any owner whose property abuts on a lane to make windows, balconies or galleries to project over the line of the lane, to the prejudice, or against the rights or privileges of other owners in the use of said lane.

Galleries constructed of wood may be attached to the front, rear or side walls of a building of the second or third class, except where the said walls abut on the line of a street, square or lane, provided:—

1st.—That the said gallery is not enclosed except with a balustrade or open trellis work;

2nd.—That no gallery shall be of greater continuous length than 35 feet;

3rd.—That the end or ends of the gallery shall be kept at least two

feet distant from an adjoining property, or if carried to the line of an adjoining property, it shall be separated from the said property by a solid brick party wall, the said wall to extend to the outside of the gallery and be carried at least one foot above the roof of the gallery, or if the gallery has no roof, to not less than six feet high above the floor of the gallery; the said wall to be not less than eight inches thick for a height not exceeding 30 feet, if over 30 feet high the first storey of the wall to be twelve inches thick.

Stairs leading from the gallery to the ground, or to an outbuilding, or from one gallery to another, shall be open, or they may be enclosed, provided that the enclosure, in all buildings of the second and third class, shall be made of solid brick not less than eight inches thick, resting on stone foundations, or if made of wood, shall have the said enclosure cased with brickwork, four inches thick, or covered with corrugated iron.

FREIGHT AND PASSENGER ELEVATORS AND DUMB WAITERS.

SECTION 102.—In any building of the second class in which there is a hoist or freight elevator not enclosed in walls made of fireproof material, the openings in each floor for said hoist or elevator, shall be fitted with substantial doors arranged and made to open and close automatically as the hoist ascends or descends.

Freight hoists or elevators in buildings of the second class, when placed in inclosures, shall have the enclosure made of solid brick not less than eight inches thick, or with an iron frame covered with metallic lathing and plastered on both sides, or be made of such other fire proof material and form of construction, as may be approved by the inspector; the walls of said enclosure shall extend at least three feet above the roof and be covered with a skylight of suitable size; should the elevator not extend the whole height of the building, the top of the shaft shall be covered with incombustible materials, and from the elevator shaft to the several floors shall be fitted with fireproof doors, which shall be kept closed when the elevator is not in use. In addition to the fireproof doors above described, each opening shall be fitted with a light metal or wire work door for a height of not less than five feet above the floor, and the said doors are to be arranged to open and close automatically as the car or cage ascends and descends.

Passenger elevators in buildings of the second class which are hereafter erected, and which are not placed in fire proof inclosures as in the precedin paragraph, may be placed in well holes of stairs or in hall ways, provided that the walls of the said staircase or hallway are made of brick, and that the stairs are made of incombustible materials and that the guide posts of the elevator are of iron.

Passenger elevators may be placed in any stair well, hall or court of any building erected prior to the adoption of this by-law, provided that a permit to do is obtained from the inspector, and that if the building is over four storeys in height, the guide posts and enclosures of said elevator are made of incombustible material.

Overhead elevator or machinery either for freight or passengers, shall have underneath it a grille or metal netting sufficient to protect the car from falling material; all cars used for passengers shall be enclosed with wood or metal, except the door opening.

No freight or passenger elevator, or hoist, erected after the passing of this by-law, shall be used until it has been inspected and approved in writing by the inspector.

All freight and passenger elevators shall, after the passing of this by-law, be examined by the inspector or by some elevator builder approved of by the inspector, not less than once in six months, and if the said elevator be safe and in good working order, a certificate to that effect, stating the date of the inspection and signed by the party making the inspection, shall be posted in the car, or at the entrance of the elevator, and any owner or occupant using or allowing to be used an elevator without a certificate of safety being thereto attached, shall be liable to a fine of ten dollars for each and every day the elevator is so used.

Passenger elevators in warehouses which are not placed in fire proof enclosures, shall have the opening in each floor through which the car passes, fitted with substantial doors, arranged to open and close automatically as the car ascends or descends, and shall have around such opening in each floor, a metal or wood enclosure not less than five feet in height above the floor, and said enclosure shall be fitted with doors opening to the hoist which are opened or shut on the inside only.

All cars, whether of freight or passenger elevators, shall be suspended by wire ropes of ample strength to safely carry the heaviest load that may be imposed on them, and all cars or cages shall be fitted with safety wedges or other devices approved of by the inspector, that will prevent the descent of the car in case the ropes should break.

All dumb waiters in self-contained houses, if of wood, must be lined with bright tin inside. All other dumb waiters, used for more than three storeys in any building, must be surrounded by solid brick walls and furnished with fire proof doors.

(To be continued.)

A charter of incorporation has been granted to the Finch Wood Preservative Co., of Toronto; capital, $20,000.

The opening ceremonies in connection with St. Andrew's Presbyterian church, Sandon, B.C., took place on the 12th and 13th inst. Mr. J. W. Balmain, C.E., is the architect of the building.

Messrs. Seaman, Kent & Co., manufacturers of rolling partitions, wood window blinds, &c., have just removed to their new factory and offices, No, 1139 to 1141 King street west, Toronto.

The Luxfer Prism Company, Limited, of Toronto, have recently removed to their new offices at 98 and 100 King street west. These offices have been specially fitted up to meet the requirements of the company's business. In the rear of the offices is their new factory.

The Canada Foundry Company has been granted a charter of incorporation with an authorized capital of $1,000,000, to establish in Toronto a foundry for the production of structural and ornamental architectural iron and cast iron work of all kinds. The company is composed of Messrs. E. B. Osler, M.P., W. R. Brock, W. D. Mathews, Wm. Hendrie of Hamilton, Fred Nicholls, T. W, Horn and W. H. Winslow of the Chicago firm of Winslow Bros. It is said to be the intention of the company, at a later date, to also establish a foundry in the western part of Canada.

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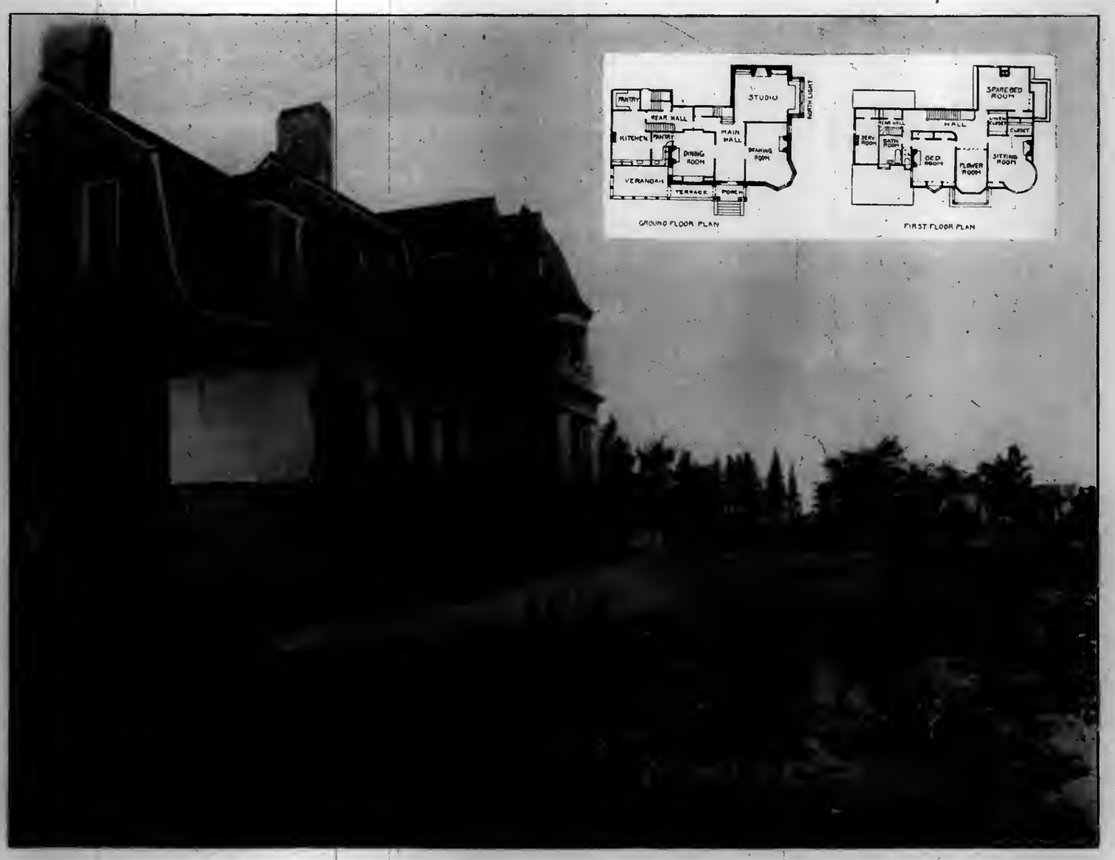

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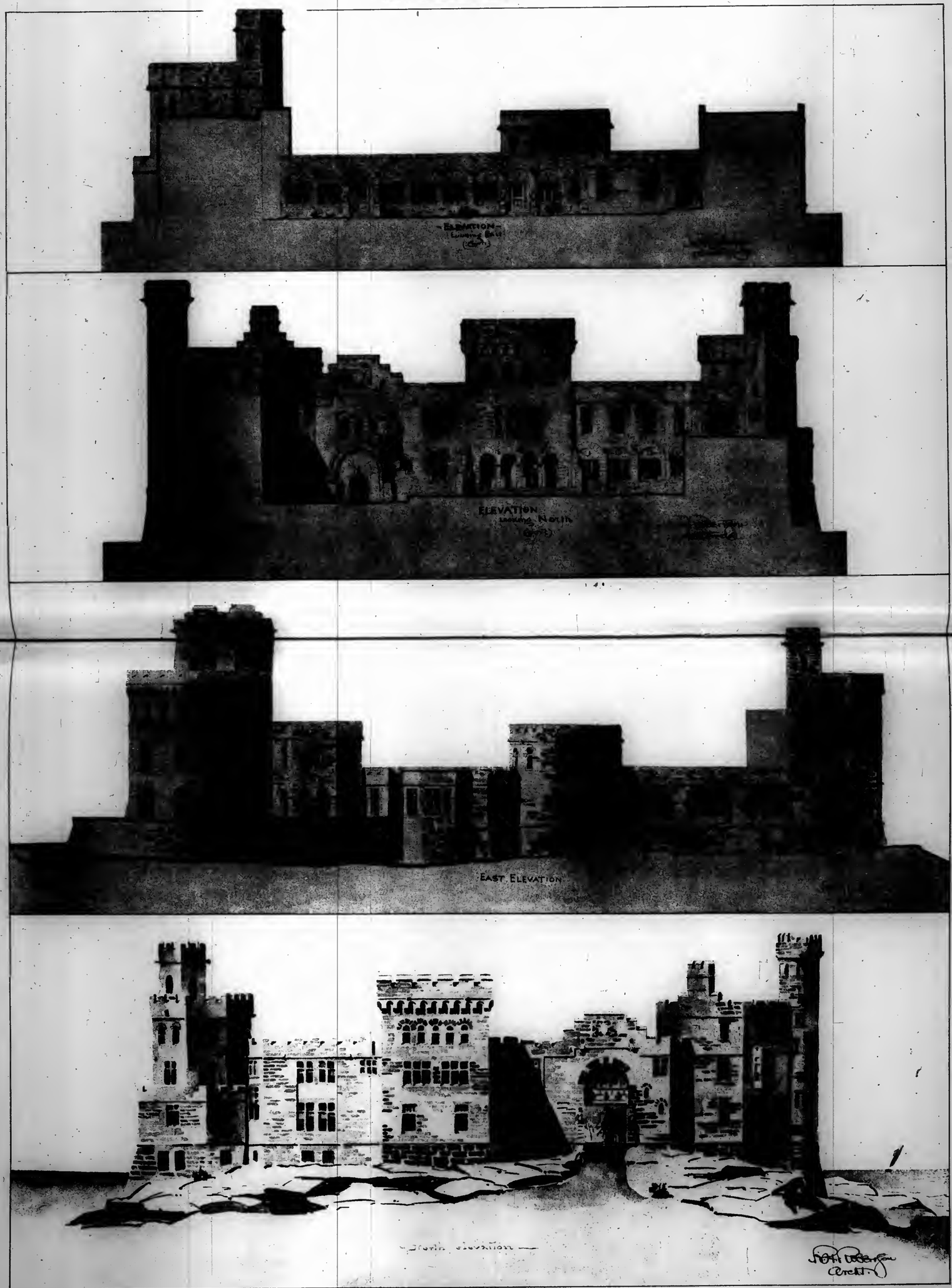

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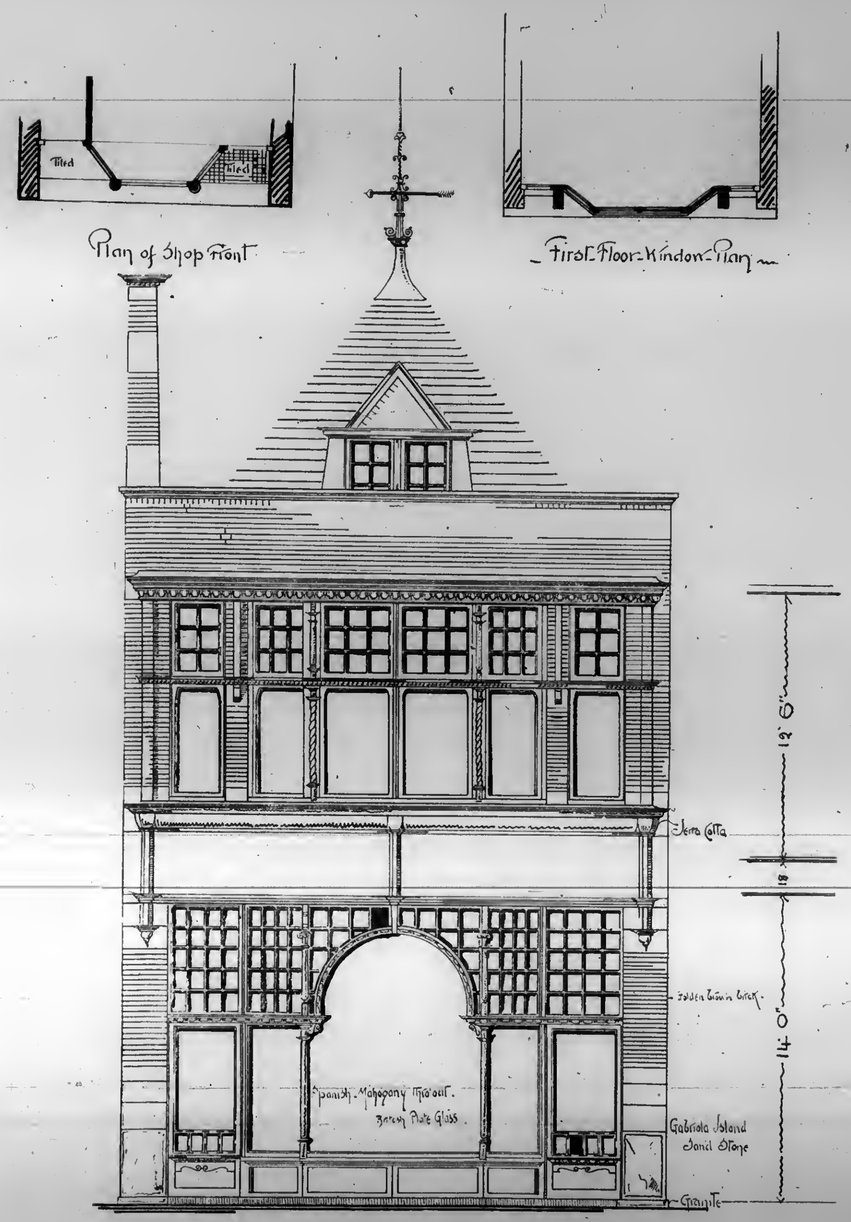

Elevation to Hastings

Robert M. Fripp F.R.I.B.A. Arch't.
July 1889

DESIGN FOR SHOP FRONT, VANCOUVER, B.C.
ROBERT M. FRIPP, F.R.I.B.A., ARCHITECT.

CANADIAN ARCHITECT AND BUILDER.

VOL. XII.—No. 12. DECEMBER, 1899 { PRICE 20 CENTS. $2.00 PER YEAR.

—THE—
CANADIAN ARCHITECT AND BUILDER,
A Monthly Journal of Modern Constructive Methods,
(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD).

PUBLISHED ON THE THIRD WEDNESDAY IN EACH MONTH IN THE INTEREST OF
ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

The C. H. MORTIMER PUBLISHING CO. of Toronto, Limited,
Publishers,
Confederation Life Building, - TORONTO, CANADA.
Telephone 2362.

Branch Office: NEW YORK LIFE INSURANCE BUILDING, MONTREAL.
Bell Telephone 2299.

SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to foreign subscribers is $2.50. Subscriptions are payable in advance. The Journal will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrears of subscription paid.

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The Cost of Remodelling Old Buildings.

An experienced architect who recently remodelled an important public building, using a large quantity of the original cut stone and brick work, states that the ultimate cost of the work was several thousands of dollars in excess of what would have been required to put up an entirely new structure. It is safe to say that this statement would apply to a large proportion of the old buildings which have been remodelled. Nor have the results usually been satisfactory, because the architect was hampered by having to conform in large measure to the plan of the old building. Taking down, cleaning and replacing old stone and brickwork is a much more costly operation than owners of old buildings imagine it to be.

Students' Competition.

ATTENTION is specially called to the announcement appearing in the Students' Department of this number regarding a competition for students and draughtsmen. The sole object of this competition is to encourage and benefit Canadian students of architecture. It has been remarked that the students of the present day in Canada do not display as great ambition or put forth as much effort to achieve success as did the students of eight or ten years ago. Our own experience in connection with recent students' competitions seems to bear out this

view, the number of competitors having been considerably smaller of late than at a former period. The students have now a favorable opportunity, by entering with enthusiasm into the present competition, to show that they are prepared to take advantage of any means of self-improvement which may be afforded them. Architects are requested to bring the competition to the notice of their students and urge them to take part. If a satisfactory result is attained, other competitions will follow. Request will be made of the judges to give in connection with their report a detailed criticism of the plans, in order that the authors may learn the weak as well as the strong features of their work.

Competition for School Plans.

THE Department of Education of Ontario has advertised for competitive plans for public school buildings ranging in size from a single room to four rooms. The highest premium is $150 and the lowest $80. It is understood to be the intention of the department to appoint experts to decide upon the merits of the plans which may be submitted. It is to be regretted that the advertisement inviting the plans does not specify the manner in which the competition is to be decided.

An English Opinion of American Architecture.

IN the London Builder of October 7th is printed an article headed "Notes in New York," in which reference is made to the modern architecture of New York. As might naturally be expected, special mention is made of the tall buildings which in recent years have sprung up so rapidly in the business thoroughfares of that city. With regard to these the writer says: "It is all very well for passers-by to say that buildings of such size are monstrosities, but seeing that utility is the first object of every building, it has to be admitted that the people of New York have by their system of building policy obtained not only space, but actually buildings in comfort and convenience up to the highest standard." The belief is expressed that, whether agreeable to the taste of the people or not, the tall building—perhaps modified in form as compared with the New York examples—will become a necessity in the large cities of the old world. It is the opinion of this writer that the educated American sets a higher value on art than does the average Englishman, or indeed a citizen of any other country except France. "There can be no doubt," he says, "that it is beyond the Atlantic that we shall find the finest buildings of the future. Energy, wealth, and a desire to produce structures which shall be at once useful and beautiful—large spaces, so far as cities outside of New York are concerned—all these things make towards the creation of finer architectural works than can be erected in an older country. Architectural individuality in New York is moreover given a very large field, a scope which is noticeable especially in regard to private houses. This freedom, though it necessarily from time to time must result in eccentricity, yet affords opportunity for much larger artistic effect than can be obtained in the more formal and systematic streets of English and Continental towns. Sometimes, also, the contrast between the opposing styles of houses which are side by side, the conflict between different materials—a red brick, for instance, side by side with yellow stone—does not tend to general harmony of effect. On the other hand, the obvious and often successful endeavor to create an individual house, pleasing to look upon—not one portion, as in England, of a monotonous street—is remarkable."

The Future of the O. A. A.

THERE are indications that the present discussion regarding the future of the Ontario Association of Architects is likely to result in benefit to that organization, and that from the suggestions which are being offered may be evolved a plan of future action designed to enhance the prosperity and uselulness of the society and permanently advantage the cause of architecture in this province. That some changes are necessary is clearly apparent. What is required, therefore, is to decide what can and should be attempted to enable the Association to achieve in the future, in a larger degree than in the past, prosperity and usefulness. This end will not be attained by criticism alone of the conduct of those who have in hand the management of its affairs. This is especially true of what may be termed "destructive criticism," such as has been indulged by some who have given expression to their views on the subject. It requires but little ability to find fault in a general way with everything and everybody. On the contrary, what may be termed "helpful criticism," which points out in a kindly spirit the causes of past failure, and suggests methods of achieving future success, should be heartily welcomed.

To those who have stood by the Association from its inception until the present, and have given much time and effort to promote its welfare, is due the highest praise. One of the greatest obstacles in the way of their success has been the unworkable and valueless character of the charter of incorporation placed in their hands by the Ontario legislature. The defects in this charter were stated in our last issue and on many previous occasions. Those entrusted with the management of the Association hoped that it might be possible to secure from the government through the legislature a single amendment which would render the Ontario Architects' Act of value to the public and the profession, viz., a restriction of the use of the title "Architect" to properly qualified persons. Influenced by this hope, they deemed it advisable to direct their efforts principally to an endeavor to secure the passing of this amendment. Could they have foreseen the failure of this endeavor, doubtless they would long ago have turned into different channels their thought and effort for the building up of the Association and the advancement of architecture.

In the light of present experience, it would appear that greater things might have been accomplished if the efforts put forth during the last ten years had been in the direction of formulating and putting in operation a system of education for the students, who, to a large extent, must decide what shall be the future status of architecture in this province. The Association's recent proposal to endeavor to provide a fund sufficient to establish a travelling studentship seems like starting at the wrong end of the ladder. The students have not had the training which would qualify them to profit by such a studentship. The greatest requirement at present is means of educating the student; the travelling studentship would naturally follow. This is the work to which we believe the Association should now turn its attention. It is impossible not to regret the loss of past opportunity, but regrets can serve no useful purpose beyond that of stimulating to further effort. The Association should profit by the example of the American Institute of Architects, which, in annual convention at Pittsburg the present month, decided to give greater attention than in the past to the subject of professional education; to endeavor to bring into affiliation with the Institute the students and draughtsmen, and after 1905 to make the passing of an examination a condition of membership in the Institute. We commend to the careful consideration of Canadian architects, both within and without the O.A.A., the thoughtful address of the retiring president of the American Institute, to be found on another page. His suggestions with regard to the necessity of enlisting the sympathy and assistance of the young men of the profession are especially noteworthy and valuable. Future success must depend upon the young men, hence the wisdom of securing their co-operation. A strong effort should be made by the O.A.A. to provide means of educating students, of encouraging them, and, where necessary, of compelling them to pass a qualifying examination. For this purpose there should be a fixed term of studentship, and no student should be accepted who is not willing to pursue the prescribed course of study and pass the required examinations.

It is desirable that a number of the younger men comprising the Toronto Architectural Club, who are not now members of the O. A. A., should be induced to join. Any obstacles which may at present stand in the way of their admission could no doubt be removed. Their adhesion should strengthen the organizatiou. In order that the Association might receive the benefit of their enthusiasm, ideas and energy, they should be given something to do, and a fair share of the responsibilitv and honors. The social spirit should be cultivated to a greater extent than heretofore. For this object it would seem desirable that the Association should, if possible, have suitable and easily accessible rooms in the heart of the city, which would serve as a rendezvous for its members, and to which access should be afforded at stated times to students for study and recreation. The Association library should be placed there, and as fast as possible should be enlarged until it should become one of the most valued adjuncts of the society. As a means of promoting acquaintanceship and good fellowship among the members, and of bringing the Association, its purposes and work before public attention, means should, if possible, be devised to revive the annual dinner, which in former years was a prominent and enjoyable feature of the annual gatherings. The suggestion which has been made that the conventions should sometimes be held outside of Toronto, is also deserving of consideration. The American Institute of Architects at its last meeting decided that in future every alternate meeting should be held outside of Washington which is the headquarters of the society. It is by no means improbable that if conventions of the O. A. A. were occasionally to be held in Ottawa, Kingston, Hamilton and London, it would be the means of widening interest in the organization and its work, and of increasing and maintaining the membership.

The announcement is made that the manual training system in the public schools, provided for by the munificence of Sir W. C. McDonald, of Montreal, will be inaugurated about the February 1st.

WARM VENTILATION OF HOUSES.*

IN the previous article upon this subject we found that in order to keep the air of an occupied room sufficiently pure for wholesome respiration it is necessary to introduce into it one cubic foot of fresh air per second per head, or 3600 cubic feet per hour. In the case of houses we can only treat the house as one compartment and see that it is supplied with fresh air in this quantity, that is to say, at the rate of 3600 cubic feet an hour for each inmate. The question is how to arrange that the supply shall be of about the quantity required.

To make a fair start in our calculations it is necessary to consider what we really mean when we say that heated air rises. The expression suggests independence of gravitation. To be perfectly accurate we should say that heated air is raised. It is the greater gravity of cold air that does the work. Being denser bulk for bulk than the warmer air, it is more forcibly attracted to the earth and flows in under the warmer air and shoves it up. In order to make warm air rise it is necessary to provide for the inflow of cold air under it; and if we have made this provision we have a system of ventilation. The ordinary furnace with a cold air duct supplying air from outside, which, when warmed, is driven by fresh supplies of cold air up into the house and out by the fire-place flues, is a system of ventilation. The complaint is often made that it is more a system of ventilation than it is of heating; and the householder gives up the attempt to warm fresh air, and tries only to make the air circulate by drawing the cool air supply to the furnace chamber from corners of the house. By thus containing as far as possible the movement of air within the house it is perhaps easier to regulate the circulation to all parts so that they may be warmed; but, as material for breathing, the air is apt to be hardly worth circulating. It is as possible to procure the proper circulation of warmed air when the supply to the heating chamber is drawn from outside the house; but this is a matter of planning. The present question is of the supply.

Air in its movements is very like water, and the law which governs the supply of cold air to a furnace is the law of spouting liquids. This law is that fluids pass through an opening in a partition at a rate equal to that with which a body would reach the earth after falling a height equal to the difference in height of the liquids on each side of the partition. Where there is also a difference in the temperature of the liquids, the pressure of density in the cooler liquid also represents height—a height equal to the difference in the volume of the liquid at its own temperature and at the temperature of the warmer liquid on the other side of the partition. The difference in temperature between the outside air and the warmed air in the house is therefore the measure of the speed with which cold air will pass through the cold air duct into the heating chamber of the furnace. Air expands $\frac{1}{491}$ of its volume for each degree Fahrenheit of heat; the difference in pressure of the column of air outside the house and the column of air inside the house, is therefore the same as if the outside column stood at a height greater than that of the inner column by as many times $\frac{1}{491}$ of its volume as there are degrees of temperature; or to state the matter generally, the difference in pressure is equal to $\frac{1}{491}$ of the height of the house multiplied by the difference

*Conclusion of article upon this subject in the September number.

in temperature. A body falls through space at a velocity per second about equal to 8 times the square root of the number of feet fallen. So that with the temperature inside a house at the standard of 70° and and the temperature outside at 20°, the house being 40 feet from bottom of furnace to top of the fire-place chimneys which form the outlets for air, the velocity with which air will pour into the cold air duct will be at a rate per second which is 8 times the square root of $\frac{70-20 \times 40}{491}$ that is to say about 8 times 2, or 16 feet a second. An allowance of 20 per cent. or more must be made for friction and other causes which detract from this theoretical rate ; so that we may take the rate of the inflowing air, when the temperature is 20° outside, as about 12 feet a second. By a similar process we can find that the velocity of inflow per second varies from about 15 feet when the temperature is zero to 10 feet when the temperature is 40°. It is then a simple matter to discover the range our cold air duct must have. As one cubic foot per head per second is the requirement, it is obvious that a duct one foot square will supply air for ten people when the temperature is 40° and need be only $\frac{10}{15}$ or $\frac{2}{3}$ of a foot for 10 people when the temperature is zero. In other words, the formula is area $= \frac{\text{quantity}}{\text{velocity}}$. In the average household of 6 persons —as we know that we require 6 cubic feet of air per second, and that air flows into the house from 10 to 15 feet per second, reckoning from 40°, beyond which we need not go, to zero, after which perhaps we may close the inlet—we can determine our inlet to have an area of from $\frac{6}{10}$ to $\frac{6}{15}$ of a foot ; that is to say, it should be 7" x 12" with a sliding door by means of which it can be reduced to about 4" x 12" or less. This is not a great affair and it becomes evident when the matter is worked out, that the householder's kick has been against a cold air duct about three times too big. For an inlet of this size the two or three fire-places that are usual in a small house will afford all the outlet necessary.

So far figures may be used with sufficient precision to serve as a guide to practice ; but when it comes to examining into the question of furnace dimension and consumption of coal there is a wide margin to be allowed for variation in the space allowed to each occupant ; that is to say, from our present point of view, in the amount of cooling surface to which the air delivered to him is exposed ; and for other varying circumstances of construction, exposure, etc. Experiment becomes the ultimate basis of practical calculations ; but it is always worth while to examine how common practice agrees with the results of calculation from the data of science.

Taking the average winter temperature as 20°, at which temperative air enters the heating chamber of our furnace for 6 persons at the rate of 6 cubic feet a second, 258,200 cubic feet will enter in 12 hours, i.e., during the time in which one charge of coal for the furnace is consumed. As dry air weighs 13 lbs. a cubic foot this means about 20,000 lbs. of air. One pound of coal as usually burned will heat 8,000 lbs. of air 4.2° Fahrenheit. We have to raise 20,000 lbs. of air to such a degree of heat as will, when distributed through the house, keep it at a temperature of about 70°. The temperature of the air issuing from the furnace chamber will need to be about 120°, in other words, it is necessary to raise the temperature of 20,000 lbs. of air 100°. This will require 60 lbs. or a cubic foot of coal in 12 hours. The fire-pot for this supply must have about twice that capacity in order to allow room also for the residuum of glowing coal for which the new charge is food. A pot 1'.0" in diameter on top, 1'.4" in diameter at the bottom, and 1'.0" deep will hold the required amount ; and the consumption will be at the rate of half a ton a week in average winter weather of 20° Fahrenheit.

FIRE TESTS.

"The Builder," London, England, of October 21, 1899, publishes the following : The British Fire Prevention Committee started its winter session by arranging a private view of its testing station at Regent's Park and showing a series of experimental tests with a concrete floor, with an iron safe, and with some wooden doors. The floor was of steel girders with a concrete filling prepared on the lines recently required by the London county council. The fire was intended to be of two and a half hours duration at a temperature of 2000 degrees Fahr., but the floor collapsed in approximately an hour and a half, before that temperature had been quite reached. The testing operations were conducted by a sub-committee of the executive, comprising several district surveyors with Frederick Farrow, Mr. Max Clarke and Mr. Charles E. Goad.

TORONTO GUILD OF CIVIC ART.

The following gentlemen were elected at the annual meeting recently to form the advisory board for the ensuing year : Laymen, Messrs. G. W. Allan, James Bain, jr., Allan Cassels, Q.C., S. H. Janes, E. F. B, Johnston, Q.C., Jos. Loudon, Prof. James Mavor, Bernard McEvoy, E. E. L. Porteous, A. J. Somerville, B. E. Walker ; architects, Messrs. Frank Darling, W. A. Langton, A. F. Wickson ; artists, Messrs. E. W. Grier, L. R. O'Brien, G. A. Reid. Mr. E. B. Osler was elected president, Mr. B. E. Walker retiring. The other officers are : Messrs. Hon. G. W. Allan and E. F. B. Johnston, vice-presidents ; James Bain, jr., treasurer ; and W. A. Langton, secretary.

PERSONAL.

The death is announced at Victoria, B.C., of Mr. A. J. Smith, a pioneer contractor of that city, aged 60 years.

Mr. Joseph R. Roy, formerly of Montreal, now resident engineer of the Department of Public Works, New Westminster, B.C., was married recently to Miss Edna Harvey of that city.

Mr. Hercules Robertson, one of the oldest, best known, and most highly respected contractors of Toronto, died at his residence in that city a fortnight ago. The late Mr. Robertson was a native of Shetland, Scotland.

We record with regret the death of Mr. John Fletcher, contractor, of Toronto, from paralysis. The late Mr. Fletcher, who was sixty-five years of age, had for many years occupied a prominent place in the ranks of Toronto contractors, and was connected with the erection of many of the important buildings of that city, including the Temple building on Bay street.

During the last convention of the American Institute of Architects, held at Pittsburg, Pa., in November last, Mr. Alcide Chausse, architect, of Montreal, was elected a corresponding member of the above named association. Mr. Chausse is also corresponding member of the Societe Nationale des Architectes de France and of the Societe Centrale d'Architecture de Belgique, and member of the council of the province of Quebec Association of Architects.

The Elliott & Son Company, decorators, are preparing to remove on January 1st to new premises on King street west, Toronto.

BY THE WAY.

Messrs. Bond & Smith, architects of the new Union Bank on Wellington street west, Toronto, have, with the approval of the owners, placed their name on the building. Other architects might well follow this example in connection with their important buildings. It would help to clarify the hazy ideas entertained by so many persons regarding the functions of an architect, and give the profession its proper standing. Further, it would induce care on the part of the architects to give their work such character that it would stand as a monument of their taste and skill.

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There are reasons why we should expect the builder of our day to rank among the most enterprising and worthy of our citizens. He has had a distinguished ancestry. Noah, the pioneer builder, spent 140 years in building the first house-boat. He may have been a trifle slow, but we know that he succeeded in making a good job. Pharoah knew a good deal about geometry, and without the aid of a steam winch piled up a mass of gigantic stones that is still the wonder of the world. Solomon, too, aided by Hiram, did a little building in his day, by which he greatly enhanced his reputation. A certain Chinese emperor comes to mind who built a retaining wall three thousand miles long to enable him to retain his kingdom against the Tartars. The wonderful temples of Greece and Rome and the great cathedrals of Europe still remain as monuments of the skill of the old builders, while in modern times we have the Crystal Palace of London, covering with glass an area of thirteen acres, the sky-scrapers of New York and Chicago, and last but not least, our own city hall, which, though it has involved a few "extras," is nevertheless a credit to a native architect and to Canadian craftsmen. The builder, like other men, has always had troubles of his own. In old Pharoah's day, labor-saving devices were unknown, but nevertheless we are told his workmen found cause for a strike, and the strike has been an event of more or less regular occurrence in the trade ever since. There have developed, also, other troubles such as lien-laws, workmen's compensation acts, etc., but in spite of all these, the builder maintains his reputation for skill, enterprise, honesty, and good humor.

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I hear complaint by the occupants of the new city hall that the automatic heat regulating system installed in that building does not satisfactorily perform its duty, but that the temperature goes up and down about as it pleases. Thermostats are placed on the walls and connected to the automatic steam valves attached to the radiators, and are supposed to be so sensitive as to open or close the valves at a variation of one degree. Owing probably to the difficulty, if not the impossibility, of maintaining an even adjustment of the air pressure from above with the steam pressure from below, the device is said to have failed in operation. When the steam pressure exceeds the air pressure the valve remains open, and the temperature goes up as high as it pleases, and vice versa when the steam pressure is weak, the valve remains closed and the atmosphere becomes uncomfortably chilly. While on this subject it might also be mentioned that the air used for ventilating the building is drawn by suction from the tower at a height of more than 200 feet above the ground level. It has been noticed that when an east wind prevails heavy clouds of smoke from the chimneys of the T. Eaton Company's steam plant strike the city hall tower at the point at which the fresh air supply is taken. When the wind is from the north the smoke from the chimneys of the electric station on Terauley street envelop the tower at about the same height. This has given rise to the question, to what extent is this waste product of the coal pile sucked into the ventilation system of the new municipal building.

ALTERATIONS TO THE CONFEDERATION LIFE BUILDING, TORONTO.

By J. Wilson Gray.

In the year 1892 the Confederation Life building was erected, not only for a home or head office for the company, but also as a revenue producer. The capital represented being large, it was necessary to consider well the best possible way to attain the greatest returns. The building was designed having three frontages—the east front on Victoria street, the south and principal front on Richmond street, and the west front on Yonge street. The design was divided into two distinct parts —an eastern section and a western—the central tower on Richmond street forming the point of division. The eastern section was set apart for the head office of the company, the first floor being designated for this purpose, and the remaining upper floors for general office purposes, with a large ball and supper room on the top flat. The elevations of this section bear the marks of this internal arrangement and are the most handsome of the two sections. The western section was designed for a warehouse or large departmental store and was consequently somewhat subordinate in exterior treatment to its eastern neighbor. Shortly after the erection of the building the departmental store proposition for the west section was abandoned, the ground floor converted into stores and the upper floors into offices, without altering the general appearance of the elevations, however advisable that might have been, so far as the Yonge street fronts for store purposes are concerned.

It is not the purpose of this paper to criticise or find fault with the design of the structure under consideration, but merely to point out what the advancement of the times has demanded since the building was erected, so far as the ground and first floors of the western section fronting on Yonge street and part of Richmond street are concerned. The immediate occupancy of the new sub-divisions of this west section was the best evidence of the wisdom of such a course, a larger revenue being derived from the stores and offices than could be got from any other enterprise. During the years which followed this occupancy, the general architecture and construction of store buildings all the world over was undergoing a change. In the great business centres of the world land was becoming more valuable day by day. The demand, therefore, was for structures occupying the least possible space on the ground floors with the structural materials, thus affording larger areas for light and display, while the heavens might be explored by the upper storeys. To meet this demand, we find the modern departmental store and office buildings being erected of fire-proof steel construction encased in brick, stone and terra cotta, all materials reduced to the minimum for strength, so as to utilize the greatest possible area for floors and windows. In some cases the lack of the fire-proof casing round the steel columns on the

street fronts is noticeable, so that every inch of space possible might be given to plate glass. To risk a whole superstructure for the sake of a few inches of plate glass may seem to be going beyond reason, but such is the case, and such is the demand of the commercial world to-day. What cannot be gained in area within a certain limit is gained in the height to which such structures are built, not ceasing to ascend till the twenty-second or twenty-fourth flat is reached—veritable sky-scrapers.

In the great commercial centres where new buildings could not be erected, the old ones are being speedily altered to meet the new conditions, and we find whole flats of heavy stonework being removed and giving place to the lighter steel construction, and what was for years a frontage of dismal stone piers, small windows, almost invisible doors, all badly lighted with gas, is transformed into large plate glass show windows, aglow with electricity, the points of support almost hidden from view with show cases and not invariably encased in mirrors. In this respect our own city of Toronto is abreast of the times. The steel construction in departmental stores has taken its place and is proving its value in remodelling old premises to meet the demand of the times. This advancement in store buildings was so rapid that the west section of the Confederation Life building fronting on Yonge street was soon left behind for store purposes, and with other new and altered structures all round, was considered out of date, and rightly so when one considers that in a total frontage in the best business section of the city of 68 feet 6 inches on Yonge street, 156 feet 6 inches on Richmond street, 104 feet 6 inches on Victoria street 57 feet were occupied with stone and lime, about three feet thick, with window reveals in some cases about two feet deep. A glance at the photograph of the building before the alteration will convince any one of the absurdity of this frontage being used for store purposes.

With a view to meet the advancement of the times and make the property more productive it was necessary to make such alterations as would bring it up to the standard of modern requirements. This necessitated the removal of the huge stone piers on both frontages, so that a prominent entrance might be made immediately on the corner to premises suitable for banking purposes, which would occupy the Richmond street front, and increase the plate glass area on Yonge street for store purposes, introducing, if possible, an additional store on that frontage. This could be done only by reducing the points of support to a minimum area by the use of steel columns with steel beams over upon which the superstructure might be carried.

In the fall of 1898 a commission to prepare plans and undertake to have the scheme carried out was placed in my hands. As soon as it became known that such an undertaking was about to be commenced speculation as to its success became rife amongst our city architects and contractors. The attempt was considered too daring to be successful, as nothing of the kind had been attempted in Canada before. Being confident however that the scheme was feasible, and satisfied that ample strength had been provided for in the construction, and that the building could be satisfactorily shored up, the contracts were awarded, not, however, without shouldering the responsibility for their successful completion upon the architect.

The problem of shoring up and holding in position such a mass of masonry and brickwork until the necessary steel columns and beams were inserted and tightly keyed up, at the same time keeping the tenants overhead safely in their offices and supplying steam heat to their premises as if nothing unusual was going on, was no easy task. The isolated construction of the building —that is to say, the weight of the superstructure being carried on isolated piers and foundations without any connection with each other except by large arches over the fifth floor—and the limited area on the two frontages allowed by the City Engineer for shoring purposes, and a retaining wall existing two feet apart from the foundation piers, were limitations which had to be contended with, and offered serious obstructions to the ordinary methods of shoring. By these limitations it became necessary to construct a system of shoring upon a very narrow base or foundation to come within the prescribed area, and also to be rigid enough to prevent any sway to the peculiar construction above.

A reference to the key sketch of shoring will explain this method and while there is only one set of shores shown in this diagram the other illustrations show how closely they were inserted in order to be efficient. The foundation necessarily had to be formed in the basement. Excavations were made to reach the solid clay upon which the first heavy timbers were laid. It was found impossible to form a sufficiently secure foundation on timbers alone because of the narrow area and limitations already referred to. It was determined at the outset to use the old foundation piers as foundations for the new steel columns, and these could not therefore be disturbed. Those foundation piers however had very heavy footings with large offsets at every course above the foundation clay. The offsets suggested their use as a means of forming part of the shoring foundation. With this end in view the foundation timbers were levelled up to the height of each footing course and overlapping them as the height was increased, so that by this means the old foundations were made to do duty in carrying the superstructure although entirely disconnected from it, the weight being equally divided as nearly as possible on each side of the foundation piers. The illustrations show how the different stages were constructed, so as to keep the concrete pavement in its position on the outside and the floors intact inside. This was done for the purpose of forming a strong bond between each stage of the shoring to prevent the whole system from swaying in any direction, an action which was very liable to occur because of the isolated construction of the building. Such a firm bond was secured by this method that it was impossible for any thrust outwards to occur without tearing out the flooring systems of three flats and all the anchorage of the heavy stack of vaults and iron beams inside. The outside shores were also well provided for. In addition to the main shores an auxiliary was inserted immediately behind each with a long heavy screw-jack inserted in the lower end for the purposes of manipulation in tightening up or slacking down. The outside shores were inclined inwards at the top at a sufficient angle to bear their proportions of the superimposed weight with safety, while the bottom was kept from sliding outwards partly by the heavy weight of the building itself and partly by heavy timber abutments sunk through the pavement deep into the ground and all firmly screwed and wedged. From the tops of the outside shores to the blocking inside, steel needles were inserted through the walls and upon those the building rested while the lower portions were cut away. A few of the illustrations show this work in progress.

As soon as the useless walls were removed the old piers were prepared for the foundation of the steel columns by placing heavy limestone courses on top and then a grille of steel beams bolted together placed longitudinally and filled in solid with concrete. By this means the weight above was distributed from the narrow base ot the columns to the old foundation area as nearly as possible.

The steel columns were formed of 15″ steel I beams rivetted together, with steel bases and plates and 15″ I beams on top, strongly reinforced at the points where the heavy crushing weights would prevail. The ends of the beams were cantilevered over the corner columns, securely rivetted together at the ends and secured on the top with a heavy steel plate cut to the radius of the corner. Upon this plate and system of cantilevers the round corner at Yonge and Richmond street is carried, and there now exists a band of steel beams securely rivetted together extending the full length of the Yonge street frontage, and a portion of Richmond street, which binds the whole together stronger than before. The columns and beams being set in their proper positions, the intervening space between the needles was built up with brick and cement and firmly wedged up with heavy slate wedges and allowed to set perfectly hard before any of the supports were drawn. Each set of beams was sufficiently secured to the existing iron beams by means of steel plates and tie rods with turnbuckles in the centre, so as to tie the old and new steel work together and make a complete connection between the two.

All exposed ironwork was fire-proofed by terra cotta casings and cement fire-proofing, the steel columns being encased in brick and cut-stone to harmonize with the other stone work of the building. The general treatment of the elevations is in harmony with the commercial requirements and restrictions, and do not materially affect the general architectural appearance of the building as a whole. The premises affected by the alterations are fitted up for general business purposes, with attractive fronts and entrances, and were all leased before the works were commenced, showing the monetary value of such an undertaking, and no doubt will continue to increase substantially the revenue of the company, as the location is becoming year by year the commercial centre of the city. I cannot close this brief description without referring to the intense interest taken in the work and the hearty support given me by the workmen on the building. Everyone seemed to realize how much was dependent on him individually. Messrs. Isaac Wardell & Son, who executed the shoring, and Mr. Alexander Marshall, the masons' foreman, were exceptionally careful and painstaking, and all employed entered heartily into the undertaking, determined to make it a success. To this care can be attributed the fact that the works were executed without a single accident of any kind. I mention these facts because it is so unusual to have such general co-operation by the workmen in such an undertaking, they invariably considering themselves wage earners only, having no further interest in the work than to fill in the time and look for pay day at the end of each week. I am glad to say this important undertaking has proven a happy exception to the rule.

The firm of Leitch & Turnbull, manufacturers of elevators, Hamilton, Ont., has undergone a change, Mr. Turnbull having retired and having been succeeded by Mr. C. H. Thompson, of Copetown.

ILLUSTRATIONS.

DESIGN FOR RESIDENCE AT HAMILTON, ONT.—W. W. LACHANCE, ARCHITECT.

ALTERATIONS TO CONFEDERATION LIFE BUILDING, TORONTO—J. WILSON GRAY, ARCHITECT.

NEW PREMISES FOR "THE STAR" NEWSPAPER, ST. JAMES STREET, MONTREAL, QUE.—R. A. DUNLOP, R.C.A., ARCHITECT.

THE ONTARIO ASSOCIATION OF ARCHITECTS' CONVENTION.

THE convention of the Ontario Association of Architects promises to have matter enough for discussion. A special committee has been at work considering in what ways that are feasible the Association can be made useful. A report from this committee will be presented to the convention, and it is hardly likely that the convention will pass without the enactment of something that will make a decided change in the present condition of affairs. The proposition to have a room down town, in association with another society, is likely to be made, in spite of the lukewarmness with which a similar proposition was met when advanced earlier in the year. The scheme is possible when combined with a proposal to make the registrarship an honorary office. The cost of maintaining a room will be met by the saving in the other department. There can be no doubt that the possession of a local habitation would foster the growth of all associated work; that meetings, the reading of papers, exhibitions of pictures, the use of a library, and students' classes and sketch clubs, all of which are the natural functions of a voluntary Association, will have a much better chance of thriving and developing. As a close corporation with power to force culture upon architects, or at any rate upon intending architects, the Association could do good work with a secretary, a board of examiners and a solicitor; but voluntary efforts require to be drawn out by opportunity and inducement, and the convenience of a room which would accumulate facilities for such efforts would be a great inducement to make them.

It is proposed to hold the convention down town instead of as formerly at the School of Practical Science. This experiment will show whether the convenience of meeting down town will be so great as to offset the privileges that have been enjoyed at the school. It ought to further a full attendance, for the Registrar's office, in which it is proposed to hold the meeting, is in a central position, near all architects' offices and also near the hotels.

All efforts of the Association to increase its effectiveness seem to be aimed at the cultivation of architecture. It's aim is always to do something for architecture; the architect is left to the operation of the law mhich makes him rise withe exaltation of his art. Yet it does seem as if a little attention paid to the commercial well being of architects would turn out to be as potent a stroke as can be made for the advancement of architecture. If a tariff of fees would give greater strength to the commercial position of architects, it would do the art of architecture a lot of good. To look at the matter from the other side: If it is true that the architect will rise with the improvement of architecture, it is equally true that architecture will decline with the debasement of the architect. It is to be hoped that, if there is in the report of the special committee no recommendation that there should be an authorized schedule of fees, the proposition will be made by somebody outside of the special committee.

BUILDING STONES AND STONE-CUTTING.*

By Alexander Marshall.

To the mason and stone-cutter a full and accurate knowledge of the materials he uses is most essential to enable him to estimate the advantages to be gained from their proper application for building purposes, so as to fill the conditions of economy, combined with utility and skilful workmanship. He should make himself acquainted with their positive and relative strength, the changes that take place from exposure to the atmosphere, moisture, heat and cold. Regard must also be had to the time and labor required in cutting them for building purposes. On the nature of the materials used in construction, the strength and durability of buildings wholly depend, and all the science we have ought to be applied to make the best selection from the materials within our reach. The most important properties of stone, as applied to building, is strength to resist compression, tension or other strains, its ability to withstand shocks and oppose friction, its unchangeable character when exposed to heat or cold—to the atmosphere or to the application of acids.

In making choice of building stone, when its qualities are unknown, it would be well to make a few simple tests to ascertain its qualities and defects. Sandstones that contain the greater proportion of silex in their composition, with a binding or cementing matter of a silicious nature, when compact and of fine grain, are the most durable, are very hard and most difficult to work, consequently very expensive where fine work is wanted, and not often used for mouldings or ornamental work. Sandstones whose component parts are silex and alumina, vary in strength and hardness, as the proportion of silex is greater or less. Alumina or pure clay is very adhesive, is incombustible, insoluble in water, but soluble in acids. It has a great attraction for metallic oxides, and thereby gives the shades of greys, reds and browns common to clays and sandstones.

When iron is to a great extent present in the cementing matter, and the stone coarse grained, disintegration soon takes place, more especially in large manufacturing cities, where it is more liable to the action of deleterious vapors and gases. The cementing matter being clay, with more or less iron incorporated, when exposed to the atmosphere the iron becomes oxidized, and is washed out by rain, leaving the surface of the stone porous and liable to absorb moisture in large quantities. When the surface of the stone is charged with water and becomes frozen, expansion takes place, the particles are forced apart, moulder away and fall off. Sandstones composed of silex, mica and alumina are generally of a more laminated nature, and being formed by the action of water, the mica in scales of greater of less size, is deposited on their flat sides. This kind of stone is much more easily split going with the bed or laminations, than at right angles to it. Great care should always be taken to have the stone placed in the wall on its natural bed. There are some sandstones so formed that it is very difficult to know the natural bed, even with the use of a lens; still, the mason or stone-cutter of experience can tell the difference when cutting the stone—it is harder and more difficult to break off across the grain than with it.

Stone, when laid on its natural bed, will resist decay from chemical and mechanical influences better, there being a smaller surface of cementing matter exposed; it will stand compression better, the layers being horizontal. There are some cases in which it is not practicable to have the stones placed on their natural bed, such as in the use of columns, pilasters, mullions and balusters. Then great care should be taken to have the stone of the closest texture and as free from lamination as can be obtained.

Stones that are fine and regular in grain, close and dense in texture, of deep rich color, of the greatest specific gravity, are the strongest, if comparatively free from drys or cracks, clay or sand holes, metal ores, such as iron or sulphur spots. When these defects are present to any great degree the stone should be rejected, as they are liable to rapid decomposition. The iron, being often found from the size of small shot to one inch or more in diameter, becomes oxidized and runs over the surface, carrying decay in its progress and spoiling the appearance of the work. All quarries have various grades of rock, from coarse to finer, and often a considerable difference in color. When selecting stone for an expensive ornamental building, it is well to see the quarry the stone is to be got from. There are generally portions of the rock that have been exposed to the weather for many years, and the layer of rock that has withstood the exposure with least signs of decay should be the layer chosen. The hardest stone is not always the best to stand exposure to dryness and moisture, heat and cold. The composition of the rock is of the greatest importance.

In a climate such as we have here the materials used for residences and house building generally should be of a kind that are poor or imperfect conductors of heat, so that the house may be cool in summer and warm in winter. At the present time dwelling houses are not built to stand for hundreds of years—there has been a revolution in that class of building. Heating, lighting and hygiene have, and are being, vastly improved, calling for the removal of old structures and the raising up of new ones. Stones that are of a dry and porous nature are mostly imperfect conductors, easy to work, consequently not so costly as those of a hard and flinty nature that are better conductors of heat.

Common limestone as a building material is not much used where good sandstone can be obtained at reasonable cost. It is durable in construction, but difficult to cut. The expense of cutting mouldings or dressing it to a smooth surface causes it to be very little used in the exposed parts of buildings. Owing to its ability to resist compression, it is well adapted for footings and lower parts of walls, where great weights and strains are to be borne.

The oolite limestone is very much used in building. Some kinds are very easily cut, and take on a beautiful smooth finish, either off the chisel or rubbed. They have generally the property of becoming harder on the surface with exposure to the atmosphere. They are mostly of a light buff to cream color, which changes somewhat after being placed in the wall. Good examples of oolite are Portland, Bath, Caen, and Bedford, Indiana. Great care ought to be taken in selection, and a knowledge of their peculiar properties is necessary in making a choice, even from the same quarries; some coarse grain stones absorb little water, while others of finer grain suck in moisture readily, and are more liable to the action of frost, and soon decay.

Oolite limestone is much used in England. Portland stone, from Portland Island, has been most extensively used, and is hard and durable when carefully selected. Bath stone, from Gloucestershire, is soft and easily worked, getting harder on the surface when exposed, and can be obtained in great abundance. It is light, bears compression well, and of cream color. The Bible training school on College street has the trimmings of this stone. Caen stone, from Normandy, France, has much the same properties as Bath, about the same color, is finer in grain, lighter in weight, and will bear a greater strain than Bath stone, but is more costly, and the best qualities can only be obtained in small blocks. The stone work in the main stair, Osgoode Hall, is Caen stone. Bedford, Indiana, stone can be had in immense quantities, and in great variety as to quality, some hard and some dense, and can resist great compression and cross strains. Some of it is coarse in grain with the laminations easily seen; other kinds are close with uniform fine grain; the laminations can only be seen on very close inspection. With oolite as with sandstone, it is most important that the stone should be laid in the wall on its natural bed. The grain in oolite stone is globular in form, packed together like fish roe. The cementing material is of the same composition as the base, but is softer and more liable to the action of moisture, heat and cold.

Granite must take the first place in building materials, owing to its great strength, hardness and durability. Its ability to resist atmospheric influence puts it in the first rank. Its durability is proved by the remains of buildings erected thousands of years ago. Granite is to be had in abundance in nearly every country, and in blocks of any dimension that means can be provided to move. It is found in various shades of color and great variety of texture and composition. It is capable of taking on a high and permanent polish. A great amount of labor is required to cut and bring it to a high finish, and it is only used in building for special purposes. For monumental work it is unequalled, and for steps, bridge piers and dock work it is the best material known. In comparing the qualities of granites, the best is that in which the grains or particles are fine, uniform in size and equally distributed throughout the whole mass. If quartz is the principal component, and the grains large, the stone is hard and brittle, and consequently takes more time and labor to bring it to a smooth surface and polish. When feldspar or mica predominate, the stone is softer and easier to dress, but more liable to decay, especially if iron, its ores, and sulphur be present in great quantities.

The art of masonry may be divided into two parts—the rough dressing, and setting of shoddy and rubble stone is what is known as stone masonry. Bricks being of a definite size and regular in form, the manner of setting and arrangement may be formed, and any workman, by practice and experience, may become able to build a good wall. It is quite different with the rubble stone used in common masonry. The workman has generally to deal with stones of various forms and sizes, and a constant exercise of judgment is required of him beyond the tact or skill gained by practice. The bonding of the work is the most essential part, and a skillful workman can make good strong work from rubble stones, though very irregular in shape. Coursed rubble and shoddy work is much easier to set; the stones being gauged to certain sizes and squared, the bonding does not require the exercise of judgment, as with common rubble.

The art of stonecutting is of very ancient origin. The tools used by the ancients must have been of the most primitive kind, consequently the labor must have been greater and much longer time taken to execute the vast works of the early ages. With the improvement in the tools used the quality of stone cutting has improved. Much larger stones are now placed in buildings, and the work is finished with more accuracy.

A stonecutter must have some knowledge of architecture, geometry and projection. His work is constantly changing from one style or order of architecture to another, corresponding with the difference in character of the buildings he may be employed on. He should be a man of taste and judgment, to give to his work the best finish in the shortest time. The mouldings and ornament in stonework are all cut out of solid materials, unlike carpenter, joiner, or plaster work, that is worked in sections and built together. Commencing with a rough block, he must define the exact size of the finished stone, make the templates and patterns required, and consider the manner of cutting the work to the best advantage and with the smallest amount of labor. There must be constant care exercised, as one careless blow may spuil the work when nearly finished, and so lose all his labor. A long and studious training is necessary to gain a sufficient knowledge to lay out and make templates and patterns for such work as arches, circular work, ramp and twist arches on a circular plan, niches, tracery, skew arches, domes, groined vaulting, etc., in an accurate and scientific manner.

The causes of decay in stone are partly chemical and partly mechanical, and may generally be traced to absorption of water; so that any contrivance that will check the admission of water will be most likely to succeed in arresting decay. Stone, when completely immersed in water, and not exposed to the air, will remain without any appearance of decay. It is when the pores become filled with water, then exposed to the air that chemical action takes place. When moist and frozen, mechanical action causes expansion of the cementing matter between the particles, then disintegration takes place. There have been many nostrums tried with more or less success to remedy decay in stone. Common drying oils, a mixture of linseed oil and sulphur, linseed oil and beeswax, solutions of various gums and resins. Oil has been used with considerable success when applied thin, when the stone is perfectly dry, or a solution of common soap dissolved in boiling water, allowed to dry and then apply a solution of alum dissolved in water. The lower mouldings and the under parts of cornices and strings are most liable to decay, owing to the water filtering through the stone. If the upper surface or wash is coated with oil it would prevent water from sinking into the stone, and obviate, to some extent, the decay of the lower parts.

* Paper read before the Toronto Chapter Ontario Association of Architects.

AMERICAN INSTITUTE OF ARCHITECTS.*

It is my province and my privilege to welcome you to this Thirty-Third Annual Convention of the American Institute of Architects, to congratulate you on the national prosperity and progress which it is your high function to symbolize in works of architecture; to refer briefly to the main incidents in the history of American architecture during the past year; and more especially, to point out how the work which we are organized to perform may be more effectually carried out and how the beneficient influence of the Institute may be more widely extended.

If architecture during the past year has made a sufficiently definite advance in structural ingenuity or artistic beauty and fitness to be noted in the official review which it is my duty to lay before you—if in this interval it has earned and is receiving from the public and the nation a more intelligent and appreciative recognition as a fine art, we may justly attribute these results to two causes: first, to the American Institute of Architects, through the cordial affiliations of its members and its organized and persistent efforts during more than fifty years of its existence; and, second, to the schools of architecture, which are now considered so essential to the generous culture of the youth of our country that they form a part of the systems of technical instruction in many of the principal institutions of learning in the United States. The splendid hospitality of Ecole des Beaux-Arts is no longer essential to the complete equipment of the American architects. During the past year the results of the special training obtained in our own schools have become very evident. The graduates are beginning to make good their place in the ranks of the profession, and the older members find that they are stimulated by a fine emulation of new blood and fresh inspiration. Almost daily new names become prominent, and new reputations are beginning to struggle with old for pre-eminence. The impulse of this new and healthy dispensation is already felt in the remotest parts of the country, and the vulgar architectural vernacular which has there prevailed is giving place to coherent and disciplined style.

The institute should take immediate measures to refresh itself from this influx of new and abounding life. It is most evident that these two powerful influences, the institute and the schools, which are thus working for the advancement of architecture, should work, not apart in rivalry, but together, in closer and more effective co-operation than heretofore.

To this end, I venture to suggest that, by a single amendment of the by-laws, the committee on education should include ex-officio, all these professors and instructors of the architectural schools who are members of the institute, and, if there are any who are not members, that they should be brought within our fold, so that this committee may act not only as a bond of union between the institute and the schools, but between the schools themselves; that the annual report of the committee should embrace a general statement of the work and methods of the schools, the number of pupils enrolled, and the names of those especially distinguished; and that the practical interest of the institute in the welfare of the students should be made evident to them by the establishment of a system of institute prizes, and, if possible, of one or more travelling-scholarships, open to the students of all the schools.

There are nearly five thousand persons practicing as architects in this country, and it cannot be denied that the professional practice and standing of this large body of men is made more secure, more honorable, more respected and more remunerative by the fact that one-tenth of their number is organized and united in a national institute, which for many years has labored successfully to promote the artistic, scientific and practical efficiency of the profession. It is true that the influence of the institute is in proportion rather to the wisdom than to the number of its members. It is no less true that the institute is organized for a far larger and far more widely distributed membership than it at present enjoys, and that, until it has such a national membership, it cannot have its full and proper effect as an instrument for the advancement of our profession, and adequately represent its dignity before the world.

The question how our strength and resources can be best enlarged is, therefore, of the first importance. The men whom the institute most needs are the men who most need the institute. A late earnest appeal to the chapters has in several localities been fruitful in securing many valuable members, as will be explained in the report of the board of directors. The Kansas city chapter has been rehabilitated and will be restored to full affiliation with the institute under the new by-laws. But the strengthening of the institute requires measures much more far-reaching. We need new chapters in every part of our wide domain, and within them, more members, and a much more active and efficient adjustment of their machinery to the needs of young men. No effort should be spared by the chapters to make their meetings so attractive and so essential to the younger men that the necessity for the existence of junior societies in their neighborhood should be less apparent, and there should be no occasion for rivalry. The institute should be especially hospitable to the graduates of the schools, and I am persuaded that, if the connection between the schools and the institute should be established on some such basis of mutual interest as has been outlined, the professors would prove the most effective recruiting agents, and that their pupils on graduation would be made to consider that junior membership in a chapter in the institute is essential to their proper and regular advancement in the profession and a necessary preliminary step in their career as architects. The institute should not only be the guardian of professional purity and dignity in practice, should not only advance the interests of our art and act as the fountain of professional honor, but should aim to secure a more effective unity of effort between old and young, so as to inspire our work with the strenuous spirit of our national life, and in this service to make our art distinctively stronger, truer, and more beautiful. Therefore the institute needs in its membership, not only the wisdom of age and experience, but the enthusiasm and zeal of youth if it would keep in closer touch with the most healthy aspiration of the profession and avoid becoming the slave of its own

*Annual address of the President, Mr. Henry Van Brunt, delivered at the Thirty-third Annual Convention, held at Pittsburg, Pa., November 14, 1899.

traditions. To this end the junior members of the chapters, recruited from draughtsmen and graduates of the schools, should be made to feel that they are wards of the institute and essential parts of its organization, and to anticipate their advancement in due time to the successive grades of associate membership and full fellowship as assurances of honorable professional positions before the world. It seems to me that the institute, under its present improved organization, would, by some such process as I have suggested, be brought into closer and more effective sympathy with the young men just entering the profession, and through such sympathy would receive at least as many benefits and advantages as it would confer.

I commend these propositions to your careful consideration, and would further propose that the Board of Directors be requested to examine into the work and methods of the most successful of the junior architectural societies or leagues with the object of formulating from their experience a scheme of exercises and duties to be recommended in a circular to the chapters, so that they may learn how to give greater interest and a more abundant life to their proceedings, and become more active and efficient agents in the practical work which this institute is organized to perform. Thus may be established a propaganda in the interests of a warmer comradeship, a purer practice, and a nobler art.

In considering what has been actually accomplished by our efforts during the past year, it is with especial pleasure that I refer to the fact that, under the operations of the Tarsney Act, public buildings at Norfolk, Va., Camden, N. J., and Ellis Island, New York city, are now erecting from the designs and under the care of private architects: that the new custom house in New York and the Judiciary building in Washington have, after fair competition, been assigned to architects capable of expressing the genius of the nation in monumental architecture; and that the Baltimore custom house and the National building at Cleveland, O., will probably soon be the subjects of competitive design. The work on buildings for the Naval Academy at Annapolis and on the Government building at Chicago is in the hands of private architects. It is probable that other public monuments, especially in the west, will be open to the profession as soon as the sites shall have been vested in the United States. The office of the Supervising Architect at Washington is thus gratefully relieved from a labor which no individual genius, however strong, and no official organization, however skilful, can be sufficient adequately to perform. But while the efforts of the institute have thus far succeeded in opening to fair and honorable competition the designing and building of the national monuments, and have made an encouraging beginning in rendering them more worthy to represent our higher civilization in terms of art, it must not be forgotten that these opportunities have been opened to us only through the intelligent sympathy of the present honorable secretary of treasury, operating under the provisions of the Tarsney Act; and that, without the accident of this intelligent and exceptional sympathy on the part of that official, the public buildings of our country would still be manufactured by the architectural machine in the treasury department, with its subdivided professional responsibilities, its baleful political affiliations, and its deliberate and extravagant methods of administration. Our attempt to formulate and obtain the enactment of a law sufficient to secure for us a truly national architecture fit to represent our highest standards in art, should not for a moment be relaxed, and our legislative committee on Government architecture should be continued, maintained, and encouraged to use every honorable means to bring about this result at the earliest possible day.

I am glad to bear witness to the fact that, in the conduct of competitions in general, the dignity and the highest interests of our profession have, during the past year, received more adequate and respectful consideration than heretofore. But it must be admitted that in many parts of our country, especially in those more remote from the great centres of activity and intelligence, the loose professional habits of many practitioners of our art still encourage the publication of "Invitation to Architects," while competitions in which the contestants are arbitrarily deprived of every proper safe-guard, and are asked to submit themselves to conditions insulting to their self-respect and devised to secure their service at the smallest possible cost, meet with ready and humiliating acceptance. Near every such locality the institute should maintain a missionary chapter to teach the primary principles of honorable practice, for the benefit not of the architects alone, but of the public.

Among the competitions of the year which have been managed in a manner creditable to the projectors, the contestants, and the judges, by far the most conspicuous and memorable is that for the laying out of the buildings and grounds of the University of California, under the "Phœbe Hearst Architectural Plan." Though the highest award in the international competition fell to a French architect, the brilliant part borne especially by some of the younger American contestants is a cause for congratulation. I should like to see this Institute, by formal resolution, recognize our indebtedness not only to the munificent and public-spirited woman through whom this important architectural event was made possible, but to the managing committee for furnishing an example so conspicuous of a fairly-conducted competition on a great scale, and for the courage and intelligence with which they have conceived a scheme of architecture which in extent and importance has not been exceedrd, if it has been equalled, in modern times.

Another cause for congratulation resides in the cordial and effective alliance between painting, sculpture and architecture as exhibited in several works of monumental importance which have reached completion during the past year. It is only by such harmonious and fruitful co-operation that the highest civilization of our times may at length begin to receive competent expression in art. The public is beginning to understand that the highest and noblest expressions of art, not only in permanent monuments, but in public pageants of merely temporary significance, are possible only through such a concert of effort, and architecture is glad to restore to her sisters of the brush and chisel the field of high endeavor in which the old masters found their greatest opportunities. We especially recognize and admire the splendid service rendered by the sculptors in the decoration of the triumphal arch erected in New York in honor of the Navy and the victor of Manilla.

I have looked forward, gentlemen of the Institute, with especial solicitude and interest to this, your thirty-third convention, as it is the first in which, under our finally amended laws, the experiment of authorized delegations from the Chapters is to be tried; the first in which the remodelling of the Constitution and By-laws has not presented itself as the paramount and absorbing topic of report and discussion; and practically the first in which the Institute has given to it the privilege and opportunity of considering at peace and without fear of interruption subjects related to the highest interests of the profession.

If, after those many years of experiment, we have at length reached an era of tranquil and prosperous development, let us realize that the best use we can make of this peace is to comprehend and to assume all the grave responsibilities which belong to the undisputed position of the Institute as the national representative and protector of a great profession and a greater art.

You may be sure that the civilized world will receive with peculiar interest all that we have to give forth in the elucidations of the strange and unprecedented conditions under which a rich and prosperous nation, unembarrassed by patriotic traditions of art, is developing style; that it will eagerly hear all that we may have to say on the practical applications of science to architecture, on the progress of invention in respect to building, on the discovery of new materials and new methods and their effect upon our art, and on the incidents of our unimaginable progress in the future. We alone are in position to influence the expression of the immense energies of our nation in architecture. Let us endeavor adequately to fulfil these duties.

I hope I may be permitted to close the address with a brief personal statement. When at the last convention you saw fit to make me president of the institute, I received the unexpected honor as an expression of consideration and respect for one whose connection with the Institute began at its first conception, forty-seven years ago. Recalling the brilliant services of my old friends and predecessors in this office, I undertook its responsibilities with doubt and severe misgivings. But as the culmination of a professional year is now, in the course of nature, drawing toward its close, and as a more precious testimonial of the good will and kindly feeling of my professional fellows, the honor was very grateful to me, and I now resign it with a deep appreciation of your generous confidence. If, possibly, it may be the purpose of my friends to propose my name for an election to a second term, as permitted by the by-laws and as customary in your practice, I must, with gratitude, decline the compliment, as I have in contemplation a long visit of study and observation in Europe.

I sincerely trust that in choosing my successor, you may be wisely guided and that he will receive the office with the consciousness that its responsibilities have increased, and are increasing with time, and that a merely perfunctory administration of it will delay the development of the great future of the Institute.

TORONTO CHAPTER OF THE O. A. A.

The regular monthly meeting of the Toronto Chapter of the O. A. A. was held on Monday evening, 11th inst., in McConkey's dining parlors. Dinner was served to an appreciative company at 6.30, after which a paper was read by Mr. Alexander Marshall, on "Stone Work and Stone Cutting." The paper, which is printed in this issue, was very instructive and the discussions thereon proved very beneficial to those present. The representatives of the Chapter to the Technical School Board were instructed to prepare a report of the year's work and submit the same to a special meeting of the Chapter to be called this month. A special interest in the Technical School work is being manifested at present owing to the proposed changes by the city council.

An interesting new catalogue has been issued by the Expanded Metal and Fireproofing Co., Limited, of Toronto. By means of carefully prepared letter-press and sectional cuts drawn to large scale, the qualities and uses of expanded metal in architectural and engineering work are clearly explained. The material is made from No. 24 to 10 gauge steel and ¼ inch plate, and in various meshes ranging from ⅜ inch, suitable for lathing, to 3 or 4 inches, as adapted for flooring and heavy railway work. Reference is made to the results of scientific tests of materials conducted in England, Germany, etc., as a proof of its strength and value for fireproofing purposes. Other advantages claimed for it are that it is light and sanitary and occupies but little space.

STUDENTS' DEPARTMENT.

CANADIAN ARCHITECT AND BUILDER STUDENTS' COMPETITION.

THE publishers of the CANADIAN ARCHITECT AND BUILDER invite from architectural students and draughtsmen in Canada, competitive drawings for a Suburban Bicycle Club House. The building to be erected on a lot 60′ x 150′ in size, to have a southern exposure, and to cost not more than $6,000. It should contain bowling alley, billiard room for six tables, gymnasium, card rooms, reading and other rooms, necessary for a bicycle club. Provision must also be made for social entertainments, such as kitchen, etc.

Competitors are required to submit drawings to ⅛ scale showing south and east elevations of building, or it lieu thereof, a perspective trom ¼ scale plan drawn at an angle of 30 degrees to the picture plane; also plans to 1-16 scale of all floors, including basement, graphic scale to be indicated on each sheet. Competitors are also asked to state briefly the materials proposed to be employed in the construction of the building.

Drawings must be made with pen and PERFECTLY BLACK INK on white paper or cardboard. NO BRUSH OR COLOR WORK WILL BE ALLOWED. Drawings should be so arranged as to admit of photographic reproduction in the illustration pages of the CANADIAN ARCHITECT AND BUILDER. The size of each page is 7 x 10 inches. No set of drawings must occupy more than two pages.

Competitors must send in their drawings under motto, marked "Students Competition," and addressed to "The publishers of THE CANADIAN ARCHITECT AND BUILDER, Confederation Life Building, Toronto," prior to 5 o'clock p.m. on Monday, February 12th, 1900. Each set of drawings must be accompanied by a sealed envelope bearing on the outside the author's motto and enclosing a card giving his full name and address.

The merits of the designs which may be submitted in this competition will be judged by a committee of the Ontario Association of Architects and of the Province of Quebec Association of Architects, whose decision shall be final. For the benefit of competitors, the judges will be requested to give a detailed criticism of each plan.

Three prizes are offered, as follows: To the winner of 1st position, $10; to the winner of 2nd position, $5.00, and to the winner of 3rd position, one year's subscription to the CANADIAN ARCHITECT AND BUILDER.

The right is reserved to publish any or all of the drawings.

NOTE.—Competitors are required strictly to observe and comply with the above instructions and conditions.

CORRESPONDENCE.

THE FUTURE OF THE O. A. A.

TORONTO, Nov. 14th, 1899.

To the Editor of the CANADIAN ARCHITECT AND BUILDER:

I must beg humbly to apologize for what must appear discourteous delay in responding to your letter of the 2nd inst., which I know was prompted by zeal in the interests of the O.A.A. but of which such dilinquents as myself are unworthy.

Since the active members of our Association have failed to satisfy themselves, or others, after some years of honest effort, would it not seem wise to try and obtain an impartial view of ourselves from the outside, and to profit by any friendly hints that might be had for the asking?

Our aims and intentions have probably been creditable and clear to ourselves, if not so well understood by others; but possibly our methods have been too amateurish. We may have much to learn from other associations, and perhaps something to gain by taking outsiders more into our confidence as to the unselfishness of our objects and our desire to do good rather than obtain and retain all the advantages.

It seems to me desirable: First, to obtain full information regarding our sister association of Quebec, which though the younger, has apparently been made a success. This may perhaps be found in your own valuable files, or through the courtesy of the secretary at Montreal, or by sending a member to Montreal to investigate and report.

2nd. A paper dealing with the growth and methods of legal, medical and kindred associations in Ontario.

3rd. A representation from the Students' League now in operation here, stating why they find it necessary to work independently of the O. A. A. or its local chapter, and what would induce them to amalgamate and work with it.

4th. A full and free expression from Prof. Galbraith and Mr. Wright, of the S.P.S.

5th. A circular letter, or personal interview, might get valuable opinions or criticism from well known architects who have withdrawn or kept out of the Association.

It is well to be able to see ourselves as others see us, and with such new views, obtained in time, the coming annual meeting might become the turning point in the career of the O. A. A.

Possibly our former friend, the new Premier of Ontario, might be prevailed on to give us some pointers as to more successful methods for obtaining the legislation which has been one of our prominent objects heretofore.

Respectfully yours,
M. B. AYLSWORTH.

ARCHITECTS' FEES.

TORONTO, Dec. 12th, 1899.

To the Editor of the CANADIAN ARCHITECT AND BUILDER:

DEAR SIR,—In your October issue appears an editorial on "Architects' Fees," which would lead many to believe that there is no standard of architects fees recognized by our courts, and infers that our judges are not acquainted with the regular rate of architectural charges, but base their judgment upon the testimony of alleged unprofessional men; further, that there are architects who are so unprincipled that they appear in court and swear that they would do certain work for half and less than half of the regular fee, to the prejudice of their fellows. Your remarks seem to be founded upon a part of the proceedings of a recent and well known law suit to recover fees. My experience has been, and I believe it has been the experience of every architect who has found it necessary to sue for a fair claim, that our courts have given judgment in full, based upon our regular rate of fees. I have always found our judges fair, and well acquainted with our practices and charges, but I have never met nor heard of the unprincipled architectural witnesses you mention, and for this reason I do not believe they exist. I am so fully convinced of this that I doubt your ability to substantiate the statements you made, therefore there is the possibility, and the probability, that the gentleman who penned the article in question may find himself in the unpleasant predicament of apologizing to the profession. There is little doubt that one of the architects referred to will resist the unfair insinuations and presumptuous comments made against him with the vigor that the case demands.

Yours in sincerity,
J. FRANCIS BROWN.

MONTREAL

Branch Office of the CANADIAN ARCHITECT AND BUILDER,
New York Life Building, Montreal,

MONTREAL, December 15th, 1899.

COUNCIL OF ARTS AND MANUFACTURES.

The council have decided to establish a class for the purpose of giving instruction in steam and hot water fitting, including piping of houses, public buildings, and factories for hot water, high, low, and exhaust steam systems. The pupils will also be taught how to set and connect radiators, and make heating coils. The class was opened on the 18th inst., and will meet once a week.

ACCIDENTAL TEST OF TERRA COTTA FLOOR.

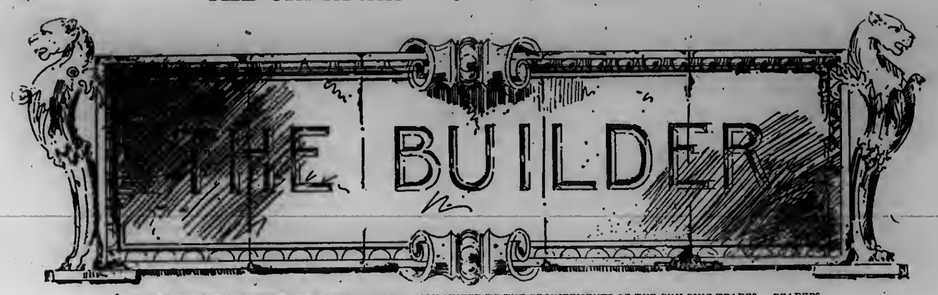
A terra cotta floor was recently built in Mr. Gatehouse's store on Dorchester st., in this city. The work was done by Mr. George Knott, Contractor, under the Supervision of Mr. C. B. Patterson architect. The floor had been in only a few days, and the centers only removed from underneath, when the workmen began to unload sand on this fresh-built floor, and before the contractor was aware of it, there was sand piled up until it is said to have represented a load of over 900 lbs. to the square foot. In spite of this heavy load the floor showed no sign of weakness and showed that it could stand over a thousand pounds to the square foot without any perceptible deflection. This test was only accidental and goes far to confirm the many previous reports as to the wonderful resistance of porous terra cotta fire-proofing.

MONTREAL BUILDERS' EXCHANGE.

There was a large attendance of the members of the above Exchange at the second annual meeting held on the 11th inst. The report of the directors presented by the honorary secretary-treasurer, Mr. George A. Sheppard, showed an increase of membership and a substantial surplus in the treasury. A cordial vote of thanks was tendered to the retiring board of directors and to the secretary-treasurer for the faithful discharge of their duties during the year. The following were elected as the new board of directors: Messrs. C. T. Williams, J. W. Hughes, C. W. Trenholme, N. T. Gagnon, H. R. Ives, John Wighton and T. Forde. At a subsequent meeting of the directors, Mr. C. T. Williams was elected president, Mr. J. W. Hughes, vice-president and honorary secretary-treasurer.

NOTES.

M. Benard, architect, of Paris, to whom was awarded the prize of $10,000 in the recent competition for designs for University of California, was a recent visitor to Montreal while en route to California. While here, M. Benard visited McGill and Laval Universities, and a number of the more important public buildings. Prior to leaving France, he was entertained at a banquet given in his honor in Paris by a number of French architects, and was presented by the Minister of Fine Arts with the Cross of the Legion of Honor.



[THIS DEPARTMENT IS DESIGNED TO FURNISH INFORMATION SUITED TO THE REQUIREMENTS OF THE BUILDING TRADES. READERS ARE INVITED TO ASSIST IN MAKING IT AS HELPFUL AS POSSIBLE BY CONTRIBUTING OF THEIR EXPERIENCE, AND BY ASKING FOR PARTICULAR INFORMATION WHICH THEY MAY AT ANY TIME REQUIRE.]

Wood Cornices for Interiors.

PLASTER cornices for interior work are expensive, and are often out of the question when a new house of the ordinary kind is being erected, owing to the limited purse of the owner. This is particularly true of farm houses and houses erected in our villages and small towns. While no sort of a cornice is more appropriate for a parlor than one formed of plaster by the expert plasterer, yet, as before stated, its heavy cost precludes the ordinary house-owner from indulging in such a luxury. A cornice made of wood, properly fitted in place and proportioned correctly, when nicely painted or stained, is, in many cases, just as appropriate and effective as one formed of plaster, and is less costly and within the range of the ordinary carpenter. Besides, a wood cornice can be put in any room and at any time after the room is finished without disturbing furniture or other things in the room. Fig. 1 shows a simple

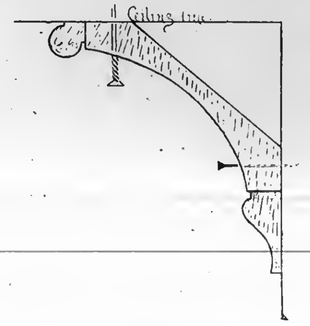


FIG. 1.

design for a cornice that may be constructed at very little cost. The cove may be made from 1½ inch plank with the hollow wrought as shown, and the top and bottom lines worked off to suit wall, ceiling and mouldings. The return bead and the O G moulding can be obtained from any wood-working factory for a cent or two per foot running measure, and in some factories large coves for crown or bed mouldings are kept in stock which might be made available for the cornice. If not, the moulding can easily be worked out by hand. When desirable, several other members may be added to the cornice, such as dentils, drops, rosettes and running mouldings. Indeed, there is no limit to the enrichments of a wood cornice, and when properly finished in harmony with finish of room, it becomes "a thing of beauty and a joy forever." Wood cornices for interior work are becoming quite popular in many places because of their adaptability to surrounding conditions. In putting up a cornice of this kind when the room has been plastered, some care must be taken by the carpenter in nailing the work to the walls and ceiling. If the building is of brick the outside walls will be strapped or furred, the straps being nailed to the wall in spaces of 16 inches from centre, and it is on these straps the wall nailing must be done. The inside walls will be of studding, placed 16 inches from centre to centre, and on these studs the nailing must be done. After finding one stud or one strap the finding of all the others on that side of the room is an easy matter, as 16 inches measured either way will locate the next strap or stud. The same rule applies to the ceiling on two sides, but on the other two sides it is very likely only the lath can be found to carry the cornice, and in such case thin long screws should be employed to attach the mouldings to the ceiling. There should be no mitreing of any internal angles, these should all be coped, then shrinkage will not expose joints or show bad workmanship. External angles around chimney breasts or other projections must necessarily be mitred, and the work must be done well as these projecting mitres are always in exposed positions. In splicing the members of a cornice never lap the joints, always make them butt; the results are better. Use the finest wire nails for the purpose. It is always best to start on the wall to put up the stuff, and a correct starting point should be obtained, and then a line struck which should be the guide throughout. Care should be taken in every case not to break the wall.

Estimating Items.

THE following estimate rules are employed by some builders in western Canada on a basis of $2.00 per day wage. The estimates are for labor only and by the square :

	Per Square.
For putting in drop siding	50 cents
" " " lap siding	62 "
" " " sheathing	20 "
" " " " it papered	30 "
" " " surface boards	26 "
" " " roof-boards—plain	25 "
" " " hip roofs	45 "
" " " very steep roofs	50 "
" " " shingles	95 cents to $1.00
" " " pine floor, 1 x 6	25 to 50 cents
" " " " " 1 x 4	28 to 60 "
" " " " " 1 x 3	60 to 95 "
" " " outside wall ceiling	78 "
" " " soffit ceiling	85 "
" " " wainscotting	$1.90 to $2.15
" " " dressing off pine floor	50 to 65 cents

In laying the tin work in valleys, a man will put down from one to one and a quarter squares per day. A good man will carry up and lay on a roof from 1,600 to 2,400 shingles per day. Two men will put on 2,000 feet of felt paper per day. Two men will lay 500 to 600 feet of outside beaded ceiling per day, or say, $7.25 per 1,000 feet. A man will put down 100 feet of plain base in a day. A man will fit and nail 400 pieces of bridging per day, at one-half cent each. Two good carpenters will lay out and frame 50 pieces of 2 x 10 joists 16 feet long in a day, or about 1,350 feet; or they will frame 100 pieces of 2 x 6 studding 12 feet long in a day, or 1,200 feet; or they will frame 70 pieces of 2 x 6, 16 feet long, for rafters, in a day, or 1,120 feet; or they will frame 14 pieces of 8 x 8 sills, 16 feet long, or 1190 feet in a day. From these figures a pretty safe estimate of the cost of labor may be obtained for the working of the items named. These figures are the result of actual experience of average day's work.

Making a Frame House Warm.

IN this Canada of ours, particularly in country towns and villages, all the studding, joists, rafters and other timbers used are just from the mill, and are, therefore, consequently, in an unseasoned condition, and will be sure to shrink more or less, and if the building is finished while the timbers are in this condition, settlements and ruptures in the plastering will be sure to take place, and much trouble and annoyance will follow. The old-fashioned plan of putting up a frame building—or a brick one for that matter—putting on the roof and enclosing, leaving windows and doors out, during the month of May, and letting it stand in this state until the early days in September, is to be commended, inasmuch as this will give time for joists, studding and other timbers to become fairly dry, and but little shrinkage will ensue, and it is much better to have the bulk of the shrinkage done before the inside finish is put in place. Floors in all cases should be double. A layer of sheathing paper should be laid between them. The first floor need not be made of good quality of stuff, so long as it is sound and driven well and tight together. The second or finishing floor should not be laid until all the plastering work is done. This is imperative where the top floor is of hardwood. Wherever possible, the span between the joists on the walls should be filled in with coarse mortar or grout for at least five or six inches above the floor. This will prevent rats, mice or other vermin from working their way into the house, and will cut off all cold drafts from the outside. The outside studding should be boarded on both sides, and should be covered with building paper before being sided or lathed and plastered. If siding is employed for outside finishing, it should be well lapped and as well nailed. If honestly put on, a sided house may be made very warm, but, if appearances do not count against warmth, the owner will do much better by having his house rough-casted, as this latter is warmer, and its use lessens the danger from fire. Roof boards should be laid tight, and heavy felt paper—well lapped—laid on the boards before the shingles are laid. The felt paper, being a non-conductor of both heat and cold, tends to keep the house cooler in summer and warmer in winter. Strong building paper should be well wrapped around the studding at window and door openings before the frames are put in place, then strips of the same paper should be well tacked about the frames, in order to cut off any chance for wind to force its way into the house from the outside. Have a spare flue in each chimney, to be used for ventilation, make openings into the flue at the baseboard and cover with an appropriate register, and with proper management of doors and windows, perfectly pure air can be secured in every room. If the building is to be heated by a hot-air furnace, or by steam or hot-water, be sure to get the heater large enough. This should be at least one or two sizes larger than the heater man says will answer. It is always well to have reserve power in your heaters; it saves fuel and never fails you when called upon to do extra work. In plastering, do not use a "brown coat" of mortar. Two coats, when well done, are as good as a dozen poorly wrought. Put the finish coat directly on the "smooth coat." Time and money will be saved, and the work will be better, harder, and more durable. Do not make the ceilings too high. Ten feet is high enough for an ordinary house in the main storey, and nine feet makes a high enough storey for bedrooms, and if there should be a third storey, eight feet six inches will make a good height for that storey. It costs quite a little sum of money to heat space overhead that is not required. Doors and windows should in all cases be fitted snugly, and yet should work freely. Attention paid to these matters will convey for all time to the householder warmth, comfort, economy and happiness.

Some Odd Mitres.

OFTEN the builder will find himself confronted with some odd problem in mitreing he has not met with before, and for a brief time be somewhat puzzled as to the proper way to go about the solution. In order to aid him in getting out of difficulties of this kind the annexed

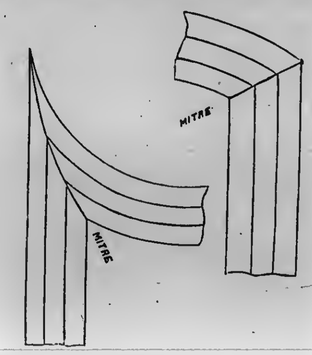


FIG. 2.

problems and solutions are presented. When a straight moulding is mitred with a curved one the line of mitre is sometimes straight and sometimes curved, as shown in Fig. 2, and when the mouldings are all curved the mitres are also straight and curved, as in Fig. 3. All

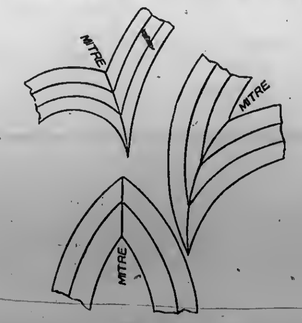


FIG. 3.

such work should first be laid out on a board as shown, and the lines correctly drawn, when the lines for the mitres can be pricked off and transferred to the mouldings. The diagrams are self-explanatory and should be readily understood.

TORONTO BUILDERS EXCHANGE.

THE annual dinner of the Toronto Builders' Exchange was held on the evening of the 12th inst., and was largely attended and in every respect a gratifying success. The President, Mr. Henry Martin, whose portrait accompanies this article, presided. The vice-chairs were occupied by the following gentlemen: Jos. Russell, Thos. Christie and Jas. B. Thomson.

Among the invited guests and members were His Worship the Mayor, Mr. E. F. Clarke, M.P., Mr. Thos. Crawford, M.P.P., Mr. J. E. Belcher, of Peterboro', President, Mr. A. F. Wickson, Vice-President, of the Outario Association of Architects, C. H. Mortimer (CANADIAN ARCHITECT AND BUILDER), J. Hoops, A. Young, Britnell & Son, D. H. Hutson, Thos. W. Self, Richard Dancy, Arch. Orr, Robert J. Orr, Alex. Orr, Geo. Orr, Jno. R. Lyon, Geo. Henry, Jno. Wickett, Jas. Wickett, Eli Wickett, Jno. R. Marshall, Wm. Forbes, Geo. Moir, Patterson, E. Dinsmore, Geo. Duthie, W. R. Payne, T. Cannon (sr.), T. Cannon (jr.), Isaac Price, Jno. Maloney, Jas. Crang, David Williams, Ben Brick, Thos. Robinson, R. G. Kirby, F. W. Robarts, J. H. Morrison, C. J. W. Neale, W. J. Bailey, Thos. Gander, Jas.

MR. HENRY MARTIN, President.

Larkin, Jno. B. Vick, Jno. Gander, T. Thomson, W. F. Thomson, R. Robson & Son, McGregor & McIntyre, Wm. Clarke, A. Y. Young, J. B. Reid, Richard Chalkley, Wm. Rennie, Holtby Bros., A. Weller, A. P. Steward, A. W. Steward, Fred. Beharriel, Jas. Muldoon, Jas. Pears, Jno. Hanrahan, A. Whellar, C. C. Witchall, A. Gardner, Edward Gearing, Thos. Painter, Wm. Prowse, F. L. Vokes, jr., (Vokes Hardware Co.), Neil Burton, Jno. Hillock, Johnson (Fox & Co.), R. Harrison, Alf. Maguire, Walter Davidson, W. F. Tasker, Ransome (Pease Furnace Co.), M. Scott (Scott & Cross), Schoulen & Bain, C. E. Williams, Jas. Morrison, Pritchard (World), Elliott, F. Holmes (jr.), Bell Bros., Jno. Price, H. Tucker, Jno. Logan, Geo. H. Orr, Wakefield, A. E. Cameron, Jas. Purse, Harry Simpson, Alex. Young (Aikenhead & Co.) A. Nelson, Jno. Vokes, McConnell, Geo. Clay.

The menu was an unique production, and attracted much attention. It was headed "Specification," and was as follows:

SPECIFICATION.

SPECIFICATIONS OF MATERIALS TO BE SUPPLIED AND LABOR TO BE FURNISHED AT THE ANNUAL BANQUET OF THE BUILDERS' EXCHANGE, TUESDAY EVENING, DECEMBER 12TH, 1899.

FOUNDATIONS—Oysters, malpecques, on the half-shell. To be bedded on an undisturbed stomach.

GROUTING—Soup. Consomme a la Macedoine. To be well mixed in proper proportion, and ladled into position.

COURSING—Fish, Lake Superior Salmon, Pommes Duchesse. To be of a rich portage entry color.

BOND TIMBERS—Supreme of Sweetbreads in cases.

JOISTING—Bread and Butter Rolls. To be laid on bond timbers and properly bridged, and to be covered diagonally with Butter (nut), knots less than 1¼ inch allowed. Hair joints will not be required in this flooring.

JOINTS—Roast Young Turkey. Properly trussed and braced and strapped at angles with ¼ x 3 inch Cranberry Sauce straps.

Beef Sirloin. To be laid up and neatly pointed with Horse-radish, with not more than 6 joints in 12 inches.

Lamb (Mary had one). This material to be well soaked with Mint Sauce; to be white struck joint and tied with French Peas.

NOTE.—Carving to be executed by experienced workmen, and to detail.

PLASTERING—Mashed Potatoes. Best 3-coat work, corners to be neatly rounded.

CELLAR FLOOR—Plum Pudding. Concrete foundation to be 12 inches deep, with broken Suet, Raisins, Currants, Peel, Flour and Eggs in proper proportions, well mixed and pounded, adding Brandy Sauce. Top 5 inches to have Celery, Cheese and Biscuits added to above and troweled to a smooth hard finish.

DESSERT.

TRIM—Unless where otherwise specified, to be clear pine, spoon cleaned, and principal rooms to be for enamel finish (Neapolitan Ice Cream) a nice cream.

HEARTHS—To be of assorted Cakes and Wafers with a border Bon-Bons and Chocolates.

HARDWARE—Except bolts (Nuts and Raisins) to be supplied by proprietor, but put in place by contractor.

DECORATIONS—The dining room to be frescoed with Apples, Oranges and Bananas.

GLAZING—To be best cut glass lemon (ade) color. Any glass of other than this color brought on the job will be entirely at contractor's risk.

TILING—To be best brown glazed Spanish (T and Coffee) make of tiles, finishing at ridge with tooth pick ridge-roll to special detail.

EXTRAS—Are to be paid for when ordered.

NOTE—This work must be strictly carried out according to details, which will be supplied by architect after the completion of work.

TOASTS.

"The Queen," "Our Country," "The City of Toronto," "The City's Industries," "The Ontario Association of Architects," "Sister Exchanges," "The Press," "The Ladies."

After an hour had been given to considering this specification, the Chairman rose to propose the toast to Her Majesty The Queen. In doing so, he remarked that, contrary to usual custom, the builders this evening were acting as the party of the second part of the contract, there being no party of the first part on this occasion. He did not think that the party of the first part would be disposed to accuse the party of the second part of not fulfilling their obligations. He heartlly welcomed the visiting guests.

After the singing of "The National Anthem," Mr. Christie rose to propose the second toast, that of "Our Country," coupling therewith the names of the local representatives in parliament, Messrs. Clarke and Crawford. Mr. Christie in proposing the toast, referred to the fact that Canada had at last taken her proper position in relation to the Empire by sending a contingent of her soldiers to South Africa. This position Canada should have taken long ago. The Dominion was destined to be the strong right arm of the Empire.

Following Mr. Christie's remarks, the Canadian national anthem, "The Maple Leaf," was heartily sung by the company. Owing to the non-arrival of Mr. Clarke, Mr. Crawford first responded to the toast, and in doing so referred to the wealth possessed by Canada in the form of mines, fisheries, and forests. Her possessions of this character were greater than those of any other country of the same population. Canadians could boast also of their connection with the great British Empire. He referred to our excellent system of government which is so planned as to work out to the best advantage of the people. He trusted that the growth of the Builders' Exchange would keep pace with the "growing time."

Mr. Blight sang with good effect, "Soldiers of the Queen," after which Mr. Alf. McGuire proposed the third toast, "Our City," coupling therewith the name of Mayor Shaw. After a song by Mr. Young of the Aikenhead Hardware Company, the Mayor, in reply to the toast, said that he was born in Toronto and had lived there all his life, and it was by the merest accident that he was not a member of the Builders' Exchange, his father having been a builder and he himself having been in his earlier days an apprentice to the trade. Just here a voice from the company remarked: "You've get a better job, John." The Mayor disagreed with the speaker on this point and said that, while he had attained a prominent position, he believed he would have been better off financially had he followed in the footsteps of his father who was a successful builder. He declared that the city government of Toronto was recognized to be a good one, and he believed that good government would continue to prevail. Toronto was never more prosperous than at the present time. New buildings and industries were springing up on every hand which he took to be an evidence of confidence in the city government. He predicted a great future for the city, and in concluding his remarks wished the Builders' Exchange the greatest possible success.

Mr. Neil Burton gave a couple of recitations in excellent style.

Mr. E. F. Clarke, who had in the meantime arrived, then responded to the toast with which his name was identified. He regarded the large attendance at the dinner as an evidence that harmony and good feeling prevailed among those connected with the building industries of the city. He was happy to know that after a period of dull times, this important branch of industry was now sharing in the return of prosperity. Referring to the toast he said that Canada belonged to an Empire of free men, and that for quality and character Canadians are the peers of any people. They had received from the motherland educational and political institutions of the highest order, and in this country there was a chance for every man to obtain a prominent position. As proof of this he referred to the fact that Mr. Alexander Mackenzie, who was by trade a mason, had risen to the position of premier of the Dominion. The fathers of Confederation had the utmost confidence in the future of Canada, "and shall we," said the speaker, "who have witnessed the larger possibilities of the country have less confidence?" With such resources it would be our own fault if we did not work out the destiny which God had in store for us. The speaker reminded his heroes that this destiny could best be achieved by each individual doing the duty which lay nearest to his hand, and dealing honestly man with man."

Mr. John Hanrahan, chairman of the carpenters' section, proposed the next toast, "The City's Industries." In doing so he said that Toronto was one of the finest cities of the world, and, according to post-office and other statistics, stood first as a business city in the Dominion. He coupled with the toast the name of Mr. J. J. Withrow, one of the oldest builders of the city and President of the Industrial Exhibition Association.

Mr. Withrow, in responding said, that if time would permit he would be inclined to become reminiscent, as he, like the Mayor, was a native of Toronto, and had witnessed its wonderful growth. He had had the honor of being, for many years, the secretary and afterwards the President of the Builders' Association, which preceded the present Builders' Exchange. At that time the industries of the city were, to a large extent, combined with building. Other industries, like that of the Massey Harris Company are now taking their place. While there would yet be done a considerable amount of building each year, it must be remembered that the city was now, to a large extent, built up, and therefore the building industry could not afford employment to so great an extent as in former years. It should therefore be the purpose of the aldermen to endeavor to encourage the location of industries in the city, and thus provide employment for the people. In conclusion, the speaker referred to the "specification" on the table, and remarked that he never saw a specification so well lived up to. The plan also seemed to have been carefully prepared. He hoped the Builders' Exchange would live on through the years of plenty and also through the years of famine.

Mr. Kirby sang "The Death of Nelson" in a manner which called forth hearty applause, after which the President proposed a toast to the "Ontario Association of Architects," coupling with it the names of Mr. Belcher and Mr. Wickson. He referred to the fact that Mr. Belcher had come all the way from Peterboro' in order to be present on this occasion.

In reply, Mr. Belcher said that exactly twenty-nine years ago he arrived in Canada, and in the following spring first came to Toronto. At that time, the Dominion Bank Building at the corner of Yonge and King streets was in course of construction. He had visited the city on many occasions since, and had marked with pleasure its wonderful progress. To-day for the first time he had entered the new City Hall, a building which reflected the greatest credit on the architect, Mr. Lennox. Osgoode Hall he described as a work of art, and made reference to some other important buildings.

Mr. Wickson followed in a humorous vein. He remarked that he was pleased to have at last found a bill of extras which he could go over without feeling that he was liable to have his innocence taken advantage of by the contractor. He reminded them that contractors, especially masons, were given to "chiselling." He noticed a growing respect on the part of builders for architects, and a disposition, when something good was required, to go to the architects for the designs and plans in preference to undertaking the preparation of them themselves, as was formerly the custom.

Mr. Henry Simpson, architect, whose ability as a ventriloquist is well known, entertained the company, and got off excellent hits on some of the public men and prominent members of the Exchange.

Staff Over Mantel—W. D. Matthews' Residence, Toronto. G. M. Miller, Architect. By Wm. J. Hynes, 16 Gould Street.

"THE MONTREAL BUILDING BY-LAW OF 1899."

(Continued from November issue)

FIRST CLASS BUILDINGS, HOW CONSTRUCTED.

SECTION 103.—In all buildings of the first class hereafter erected, the external party or partition walls shall be made of stone, brick or terra cotta, in conformity with the provisions of this by-law; the beams of floors, roof, etc., and all supports other than brick or stone walls, shall be of iron or steel, of such size and so arranged that the maximum fibre strain shall not exceed 12,000 lbs. per square inch for iron, and 16,000 lbs. for steel. The beams forming the floors and roof, shall be filled in between, with porous terra cotta, hollow tiles or burnt clay, brick, cement, concrete, or other incombustible material, which is also a slow heat conductor, and such terra cotta, tiles, brick, or concrete shall completely invest the beams in such manner that in no part shall there be less than two inches of such covering on the iron or steel.

The beams supporting the terra cotta, hollow tiles, brick, or concrete, shall not be spaced further apart than 6 feet. All beams, lintels, supports or other metallic structure shall be protected against the effects of fire by a covering of incombustible material, which is also a slow heat conductor; these materials shall be applied to the metal with cement in such manner that every part of the metal is invested by not less than two inches in thickness of said material.

All cast iron, wrought iron, or steel columns shall be made true and smooth at both ends, and shall rest on steel or iron bed plates, and have iron or steel cap plates, which shall also be made true.

All iron or steel beams, of whatever kind, shall be suitably framed and connected together; and iron or steel girders, columns, beams, trusses, and all other iron or steel work of the floors and roof shall be strapped, bolted, anchored, and connected together, and to the walls, in a strong and substantial manner, and such connections, shall be made in the manner recommended in steel or iron construction.

Iron or steel floor, or roof beams shall be so arranged as to spacing and length of beams that the load to be supported by them, together with the weight of the materials used in the construction of said floors or roof, shall not cause a deflection in the said beams of more than one-fiftieth of an inch per lineal foot, and they shall be so tied together as to prevent lateral deflection.

Under the ends of all iron and steel beams where they rest on the walls, stone or iron templates shall be built into the walls; said templates, if of stone, shall not be less than twenty inches long, by twelve inches wide, and eight inches thick; if of iron or steel, they shall be not less than twelve inches long, by eight inches wide, and one inch thick.

In all first class buildings the stairs, elevator, enclosures, cars, guides, supports of machinery, etc., shall be made entirely of incombustible materials; no wood-work or other inflammable material shall be used in any of the partitions, furrings, or ceilings, excepting, however, that the doors and windows and their frames, the trimmings, the casings, and the interior finish and the floors may be of wood, provided that they are filled solid at the back with fire-proof material.

SECTION 104.—In all first class buildings constructed on the skeleton principle, wherein all external and internal loads and all strains, are transmitted to the foundations by a frame work or skeleton of metal, such frame work or skeleton shall be so constructed in all its parts that the maximum fibre stress shall not exceed 16,000 lbs. per square inch, for steel, or 12,000 lbs. per square inch for iron. All the supports, beams, girders, etc., shall be joined by riveted connections, in such manner as to rigidly connect all parts of the frame together.

If buildings of skeleton construction are designed so that their enclosing walls do not carry the weight of the floors and roofs, then their walls may be reduced in thickness less than herein before provided for, excepting that no wall shall be less than twelve inches in thickness, and provided also that such enclosing walls shall be thoroughly anchored to the metal frame or skeleton, and provided also that wherever the weight of the said walls rests upon beams or pillars, such beams or pillars must be made strong enough in each storey to carry the weight of the wall resting upon them without reliance upon the walls below them.

The floor and roof beams in such buildings shall be filled in between with incombustible and similar material, and all parts of the metal thoroughly protected from the fire with slow heat conducting material, and the framing of iron or steel, strength of beams, bearing of post, columns, and beams, construction of stairs, and elevators, and the use of wood for interior finish shall be governed by the provisions of the preceding section.

THEATRES AND OPERA HOUSES.

SECTION 105.—Every building hereafter built or altered to be used as a theatre for dramatic, operatic or other similar purposes, involving the use of a stage with movable or shifting scenery, curtain and machinery, shall be a first class building, and the highest part of main floor of auditorium shall not be over seven feet above the level of the street or pavement on which the doors of exit are located.

Every theatre referred to in the preceding paragraph shall have the front in which the main exits are placed, made as wide as the auditorium, including the passages or stairways leading to the galleries, and said frontage for the whole height of the building shall be upon a street or square. Should another building intervene between the said front in which the main exits are placed, and a street or square, then the said front shall be upon a court or passage way not less than thirty feet wide, and open to the sky, and said court shall communicate with a street or square by a passage way also open to the sky, and not less in width than thirty feet; should the exit from said court to a street or square be through another building, the said exit or passage way shall not be less than thirty feet wide, and unobstructed, and should it be ceiled over, the ceiling and the walls supporting the ceiling shall be constructed of substantial fire proof material.

There shall be at least two independent exits from each division, compartment, or gallery in such theatre; every such exit shall shall have a width of at least 18" for each one hundred persons which the division, compartment, or gallery to which it leads, is capable of containing; three or more exits may be substituted for the two exits above required, provided they are of the same aggregate width; no exit shall be less than five feet in width, and the doors of such exits shall all open outwards only. In addition to the exits before mentioned there shall be provided where practicable, direct exits from the main floor or auditorium to a street, square, lane, or court, and such exits shall be provided with suitable light doors or sashes opening outwards, and secured on the inside only in such manner as will admit of their being readily opened in case of fire or a panic.

Should a room intervene between the doors from the auditorium above described, and the street or square, which would prevent or impede the egress of an audience in case of fire or panic, a distinct corridor shall continue from the said doors to the street or square, and should the street end of said corridors be fitted with doors they shall open outwards, and be fitted with fastenings on the inside only; all exits from such buildings shall be opened for the use of departing audiences and shall have fastenings on the inside only. Plans showing the exits and stairways shall be printed on every programme or play bill. There shall also be posted in some conspicuous place on each gallery or floor, and also on the stage along with the regulations referred to in this section, a diagram, showing the stairways and exits. Rooms in theatres for the use of persons employed therein shall have at least two independent exits; all exits here described shall have the word "Exit" in letters at least 6 inches long painted on the auditorium or stage side of such exit.

Each gallery in such building shall have at least two independent staircases located as far apart as possible and extending from the gallery to a street or square, or to a court or lane, having open communication with a street or square.

All such stairs shall be of incombustible materials, except the treads, which may be hardwood, and shall be of ample strength to sustain the load to be carried, the cut of the strings for such stairs shall not exceed 6½ inches rise, nor be less than 12½ inches on the tread. No winding steps shall be used.

No stair shall be less than 4 feet 6 inches wide in the clear, no platforms less than four feet; there shall be no flights of more than fifteen nor less than three steps between landings.

All stairs and landings shall have a substantial hand rail on each side; stairways of twelve feet or over in width shall have one, and stairs sixteen feet or over, two intermediate hand rails firmly secured to the steps.

All corridors, passage ways, aisles, etc., in such theatre shall be of ample and uniform width, and, if possible, widening towards the exits, to afford easy exit from the building, and shall be kept during performances free of all obstructions of whatsoever kind. No temporary seats, and no person shall be allowed to remain in any aisle or passage way during a performance.

All passage ways and aisles on the respective floors in the auditorium having seats on both sides of same, shall not be less than 3 feet wide where they begin, and shall be increased in width towards the exit in the ratio of 1½ inches to every 5 lineal feet. Aisles having seats on one side only shall not be less than 2 feet wide at their beginning, and increase in width the same as aisles having seats on both sides.

The stage of every theatre shall be separated from the auditorium by a brick wall not less than sixteen inches thick, which wall shall extend the whole width and height of the building, and two feet above the roof. There shall be no openings through this wall except the curtain opening at or below the level of the stage. These latter openings shall not exceed twenty-one superficial feet each, and shall have bright tinned wood self-closing doors, securely hung to rabbeted iron frames or iron rabbets in the brickwork, or wood frames covered with bright tin.

The finish or decorative features around the curtain and wood work of the stage shall be covered, and if practicable saturated with fire resisting material.

No fixed portion of the stage except the floor shall be of wood.

The framing of the floor of the stage shall be steel or iron. The framing and floors of fly galleries and rigging lofts, and all rails, with the supports and stanchions of the same, also all sheeves and pulleys and their supports, shall also be of steel or iron.

The proscenium or curtain opening of every theatre shall have a curtain of incombustible material approved by the Building Inspector, sliding at each end within iron grooves securely fastened to brick wall and extending into such grooves not less than six inches on each side. That curtain shall be raised at the commencement of each performance and lowered at the close of same and operated by approved machinery.

There shall be over the stage of every theatre one or more ventilators constructed of incombustible material; the area of said ventilators shall equal one-thirtieth of the total area of such stage; every such ventilator shall have a damper or valve so arranged and counter-balanced as to open automatically, and shall be kept closed when not in use by a cord reaching to the prompter's desk; such cord shall be of incombustible material, and so arranged that if it is severed the ventilator will open automatically.

STORE ROOMS AND WORKSHOPS.

All scene docks, carpenter, or property shops, and wardrobes of every theatre hereafter built, shall be separated from the stage, auditorium, or dressing rooms, by brick walls not less than twelve inches thick. There shall be no openings in these walls to the auditorium, or dressing rooms, and all openings to the stage shall have tinned wood doors securely hung to iron frames, or to iron rabbets in the brickwork.

All rooms in any theatre for the use or occupancy of persons employed therein shall be located as remote from the stage as practicable, and shall have at least two independent exits to a street, lane, or court; the partitions, floors, walls, etc., of such rooms shall be constructed of incombustible materials.

There shall be at least two four inches stand pipes on the stage of every theatre, with ample provision of hoze and nozzle, attached to the stand pipe at each level of the stage on each side, and the water shall be kept turned on said stand pipes during the occupation of the building by an audience. Over the whole area of the stage there shall be a complete system of sprinkler pipes, with automatic sprinklers approved of by the inspector, the size of said pipes and spacing of sprinklers shall be according to the rules of the Mutual Mill Fire Insurance Coys. and shall be supplied by mains connected with the city water pipes. The proscenium opening shall be provided with sprinkler pipes and sprinklers, so constructed that when in operation there shall be a complete water curtain for the entire width of the proscenium opening.

There shall be on the stage of every theatre in addition to the stand and sprinkler pipes before mentioned, four casks full of water with two buckets to each cask, the said casks and buckets shall be painted red and marked "For Fire Use Only" there shall also be not less than four portable Babcock or other automatic fire extinguishers approved of by the inspector, said extinguishers shall be placed in some conspicuous position and within easy reach.

In some conspicuous place on each gallery and floor the regulations for the protection of the public against fire or accident shall be posted.

Every theatre shall be illuminated entirely by electric light; the lights in the entrance halls, corridors, and stairways shall be independent of the lights in the auditorium and stage, and shall be kept lighted during a performance and until such time as the audience has left the building. There shall be a light opposite each exit, and at the top and bottom of each stairway, and all such lights shall have glass globes colored red.

All gas and electric lights in the halls, corridors, lobby or any other part of said building used by the audience, except the auditorium, must be controlled by a separate shut off located in the lobby, and controlled only in that particular place.

In cases where electric light is not obtainable, o when the electric apparatus is out of order, gas light may be used.

Gas mains supplying the building shall have independent connections for the auditorium and the stage, and provision shall be made for shutting off the gas from the outside of the building. Where interior gas lights are not lighted by electricity other suitable appliances to be approved by the inspector, shall be provided.

All suspended or bracket lights surrounded by glass in the auditorium or in any part of the building devoted to the public, shall be provided with proper wire netting underneath.

No gas or electric light shall be inserted in the wall woodwork, ceiling or any part of the building unless protected by fireproof material.

All lights in passages or corridors in said building and wherever deemed necessary by the inspector, shall be protected with proper wire network.

The footlights in addition to the wire network shall be protected with a strong wire guard not less than 2 feet distant from said footlights, and the trough containing said footlights shall be formed of and surrounded by fire proof materials.

All border lights shall be constructed according to the best known methods, and subject to the approval of the building inspector, and shall be suspended for ten feet by wire rope.

All ducts or shafts used for conducting heated air from the main chandelier or from any other light or lights, shall be constructed of metal, and made double with an air space between.

All stage lights shall have strong metal wire guards or screens not less than 10 inches in diameter, so constructed that any material in contact therewith shall be out of reach of the flames of said stage lights, and must be soldered to the fixture in all cases.

The stand pipes, gas pipes, electric wires, hose, foot lights, and all apparatus for the extinguishing of fire or guarding against the same, as in this section specified, shall be under the control of the inspector of buildings, and he is hereby directed to see that the arrangements in respect thereto are carried out and enforced.

No boiler, furnace engine or heating apparatus shall be located under the auditorium, nor under any passage, stairway, or exit of any public building.

SECTION 106.—No theatre hereafter erected, or altered to comply with the foregoing provisions, shall be opened to the public until the same has been examined by the inspector and approved by him as conforming to the requirements of this by-law. It shall be the duty of the inspector to visit every such theatre at least once every two months, to ascertain if the provisions of this by-law are observed, and to bring to justice any person in contravention thereof.

CONCERT AND ASSEMBLY HALLS, CHURCHES, HOTELS, ETC.

SECTION 107.—No public assembly or concert hall or church (with the exception of halls in school buildings) which are capable of seating 400 or more persons shall be placed in any second class building at a greater height above the pavement or street than twenty feet to the level of the main floor of said hall or church.

Every such hall or church shall have at least two stairways leading to a street or square, or to a court or lane communicating directly with a street or square, the said stairs shall not be less than five feet in width in the clear, and shall increase six inches in width for every additional fifty persons which the said hall or church can contain over four hundred, the said stairs shall be constructed of incombusible materials except the treads which may be of hard wood, and shall be of ample strength to safely bear the loads which may be imposed on them; in no case shall there be windows in such stairs without the consent of the inspector, nor shall there be more than fifteen, nor less than three steps between platforms or landings, the cut of the string for such stair shall not exceed 6½ inches rise nor be less than 11½ inches on the treads; no winding steps shall be used.

All such staircases shall be enclosed on at least three sides with solid brick or stone walls.

In all assembly and concert halls, churches, and all buildings of a public character to be hereafter built, such as hotels, restaurants, railroad depots, or other buildings where 200 or more persons may assemble, the stairways, halls, corridors, and exits shall be of ample size, and so arranged as to afford easy egress in case of fire or accident, to the persons therein assembled, and so as to afford requisite and proper safeguards for the public protection.

The exits from such buildings shal be made to open outwards and in conformity with the provisions of this by-law.

All aisles and passage ways in assembly or concert halls, or theatres, shall be kept free from temporary seats, or other obstructions that might interfere with egress, and no person shall be allowed to occupy any of the aisles or passageways during any performance, lecture, service, exhibition, concert, ball or other public assemblage. The width of the passage ways and aisles to be similar to that required in section 105 for theatres, etc., excepting that for churches, minimum width must be 4 feet wide when seats are on both sides, and 3 ft. wide when seats are on one side only, and the sides of same may be parallel.

The stairways and exits from any hall or main corridor in such buildings, also the stairways and corridors in any lodging, tenement, or apartment house, or hotel, or other similar building, in which 30 or more persons lodge at night, and where the exits from the same to the street are in common to all the occupants, shall be indicated at night by a gas, or electric light, enclosed in a glass globe, colored red.

In halls, churches, or other such buildings which are temporarily occupied at night, the said lights shall be kept well lighted during the term of any lecture, service, exhibition, ball, or other public assembly, until the audience or assembly has departed from the building.

In hotels, lodging, tenement or apartment houses, or other buildings of similar character, occupied during the night by 30 or more persons, the said lights shall be kept lighted from dusk to dawn, and said building shall also have one or more gongs so placed, and of such size and number, as to give an alarm throughout the house in case of fire, and in every sleeping room there shall be conspicuously posted directions for escape in case of fire. In all hotels, where deemed necessary by the inspector, there shall in addition be one or more competent watchmen on duty during the night.

The inspector may make further requirements for prevention and escape from fire as may be reasonably necessary.

SECTION 108.—It shall be the duty of the inspector, as soon after the passing of this by-law as possible, to visit and inspect every existing theatre or public building, and if any be found in any important respect to be contrary to the provisions of this by-law he shall immediately give to the owner of the building, notice in writing, requesting him within a reasonable delay to do anything required to be done as far as practicable, to bring said building in conformity with the requirements of this by-law.

If any such owner to whom notice has been given as aforesaid, makes default in complying with the directions therein contained within the time specified, he shall be liable to the penalty in section 209 of this by-law, and until he has complied with such directions, no assemblage, representation or performance whatsoever shall be held in such theatre, hall or building, and the inspector is hereby empowered to placard on the outside of the building near the entrance in a conspicuous position, that this building is dangerous.

SCHOOL BUILDINGS.

SECTION 109.—No second class building hereafter erected, or which may be altered to be used as a school, shall exceed three storeys in height above the pavement.

Any school building hereafter erected exceeding three storeys in height above the pavement shall be a first class building.

Every second class building used as a school, which is more than one storey in height, and which is capable of containing 400 or more pupils, shall have at least two stairways placed as far apart as practicable, such stairs shall not be less than five feet wide in the clear, and shall increase six inches in width for every fifty pupils which the school building is capable of containing over 400.

In school buildings which are three storeys in height, the stairs shall be constructed of incombustible materials, except the treads, which may be of hard wood. The said stairs, whether in a building of two or three storeys in height, shall be enclosed on at least three sides with solid brick or stone walls.

An assembly hall may be made in the second or third storey of such school building, provided that such hall is used exclusively for school purposes.

VENTILATION.

SECTION 110.—All school buildings, churches, concert or assembly halls, or public buildings, where a number of persons may assemble, also all factories or workshops where a number of persons are employed, shall have an efficient system of ventilation, and such system shall be shown and indicated upon the plans of the building when they are submitted to the inspector for approval, as provided for in section 22.

INSPECTOR OR HEALTH OFFICER MAY ORDER BUILDINGS UNFIT FOR HABITATION TO BE VACATED.

SECTION 111.—Whenever it shall appear to the satisfaction of the inspector that any building or part thereof is unfit for human habitation, by reason of its being so infected with disease as to be likely to cause sickness among the occupants, or by reason of its want of repair has become dangerous to life, he may issue an order, and cause the same to be conspicuously affixed to the building or part thereof; the said order shall also be personally served upon the owner, agent or lessee, if they can be found, in the city or district, requiring all persons therein to vacate such building for the reasons to be stated therein aforesaid.

Such building or part thereof shall, within ten days thereafter, be vacated; or within such shorter time not less than twenty-four hours, as in said notice may be specified.

But said inspector, if he shall become satisfied that the danger from the said house, or part thereof, has ceased to exist, may revoke such order, and it shall thenceforth be inoperative.

TENEMENT HOUSES.

SECTION 112.—No building for a tenement or lodging shall be erected on any lot where there is another building, unless a space as hereafter mentioned is maintained between the said buildings; if one of the buildings is one storey high the space shall not be less than ten feet; if both buildings are two storeys high the space shall not be less than twenty feet; if both buildings are three storeys high, or if one of them is three storeys and the other two storeys, the distance shall not be less than thirty feet; if the buildings are over three storeys high the distance shall not be less than thirty-five feet.

Between the rear of any building, erected or converted to the purposes of tenement, or lodging house, which is not over two storeys high and the rear line of a lot, there shall be a distance of not less than ten feet, unless the rear line of said lot is a lane of not less than fifteen feet wide; if the said building is three storeys or over in height the distance from the rear line shall not be less than fifteen feet, unless the rear line of said lot is a lane, in which case the building may be within eight feet of the lane.

Such open spaces may be modified or lessened in special cases, with the consent of the inspector, and may be dispensed with on a corner lot with the permission of the inspector.

In every such tenement or lodging house, every habitable room except rooms in an attic storey, shall be in every part not less than eight feet in height from the floor to the ceiling; and every habitable room in the attic of any such building shall be at least eight feet in height from the floor to the ceiling throughout not less than one-half the area of such room.

Every habitable room in such tenement and lodging house, and every habitable room in any other building, shall have at least one window connecting with the external air, either on a street, square, lane or court, or into a light shaft, the dimensions and position of which shall be approved by the inspector.

The total area of window or windows in every such room communicating with the external air or with a light shaft, shall be at least one-tenth of the superficial area of every such room; and the top of one, at least, of such windows shall not be less than seven feet and six inches above the floor, and the upper half, at least, shall be made to open the full width when the windows of said rooms are fitted with double or winter sashes; the said sashes shall have ventilating openings of not less than 24 square inches in each sash.

A habitable room in any building lighted by a sky light placed in the ceiling, and having a shaft not over six feet in depth between the ceiling and the external air, shall be considered as equal to a room with a window opening to the external air or to a light shaft, as described in the preceding paragraph, provided that the said skylight is fitted with a metal ventilator of a pattern approved of by the inspector, and being not less than eight inches diameter in the tube, and that the opening in the ceiling below the skylight, if fitted with a sash or sashes, shall have said sash arranged to open. Every room used as a sleeping room shall have a fanlight over the door made to open.

No tenement or lodging house, or any portion thereof, shall be used as a place of storage for any combustible article, or any article dangerous to life or detrimental to health, nor shall any horse, cow, calf, pig, sheep, or goat be kept in said house.

ELEVATORS FOR STORAGE OF GRAIN OR COAL.

SECTION 113.—Elevator buildings (which term shall be interpreted as including all buildings intended solely for the receipt, storage and delivery of grain or coal, in bulk) shall only be erected on a site approved of by the city council. Said elevator may be constructed with bin walls, made entirely of wood, provided such walls are made solid and without cellular open spaces within them.

The external bin walls shall have a covering of brick, slate, metal or other incombustible materials. If brick is used for casing, it shall not be less than eight inches thick, and securely fastened to the woodwork by iron anchors. If the weight of the bins is independently carried on a skeleton construction of wood, steel or iron, and does not rest upon the enclosing walls, the enclosing walls as high as the bottom of the bins shall be made of brick not less than twenty inches thick, or stone not less than thirty inches thick.

The walls and roof of the copula, and the roof on the bins on such buildings, shall be covered with incombustible materials, also the road ways and the ground floor, together with the supporting timbers when detached. All the external openings in he copula shall be covered with wire netting made of No. 14 wire, with mesh not over ½ × ½ inch.

The engine and boiler used in connection with any such elevator shall be enclosed with solid brick walls, and the roof over the same shall be fireproof. Any opening between the engine room or boiler house and the elevator shall be fitted with fireproof doors as before described in this by-law.

Any elevator building lighted by gas shall have all the lights protected by a wire basket or cage.

Every such elevator building shall have two four inch stand pipes connected with the water mains, and carried up to the copulas, the lower end of each pipe to be fitted with a valve, and the end in the copula with a valve, and not less than 100 feet of hose and branch pipe, attached to same.

STABLES.

SECTION 114.—Stables for private use may be erected, provided that said building is not more than two storeys in height, and may be third class buildings provided that the walls of said buildings are built upon or about upon the line dividing two properties shall be made of solid brick not less than eight inches thick, and that said wall shall be carried above the roof to the height mentioned for party walls in this by-law.

SECTION 115.—No person shall hereafter erect or alter an existing building to be used as stable, having stall accommodation for more than eight horses, nor shall any person erect or use such building for the keeping of horses and carriages or other vehicles, commonly known as a livery stable, or for the board and treatment of horses commonly known as veterinary stables, without having complied with the following conditions, and obtained a permit from the inspector and the sanction of the council.

An applicant for such permit shall give at least ten days public notice of his or her intention to apply for the same to the council, in the newspapers in which the notices of the said council usually appear, which notice, stating the dimensions and purposes for which said proposed buildings are to be used, shall be placarded in legible type, the letters of which shall not be less than ½ inch in height, on the lot on which said building is to be erected, or on the building proposed to be used for said purposes, so that neighboring proprietors, residents and others interested may have an opportunity of opposing the granting of said application. and no such application shall be entertained by the council unless notice has been given as herein provided.

Upon the receipt of such application, the council shall refer it to the Fire and Health Committees, and the inspector shall examine the premises where such building is proposed to be erected, or the building proposed to be used for such purpose, and shall hear the interested parties, and report to the Fire Committee. Should the council sanction the erection or alteration of said building the inspector shall issue a permit therefor as provided in this by-law.

VAULTS UNDER PAVEMENTS.

SECTIONS 116.—Any person wishing to use the space under a sidewalk shall first make application for permission to do so to the City Surveyor, submitting proper plans of same, and if said application is granted, pay the fees for such privilage as determined by the Road Department.

Any person utilizing the space below the sidewalk shall enclose said space with stone or brick walls, of sufficent thickness and strength as to retain the roadway, and resist all lateral pressure, the roof of said vaults shall be constructed of incombustible material supported on steel or iron beams, or brick or stone arches.

The surface of said roof shall be finished with stone, asphalt, cement or other covering prescribed by and made under the direction of the City Surveyor.

Openings in the roofs of said vaults for the admission of light or coal shall be covered with lights of glass in iron frames with raised points, or with iron covers having a rough surface, and made flush with the sidewalk; such lights or covers must be approved of by the City Surveyor.

FLOORS OVER AREAS.

SECTION 117.—Any area of space in a yard or elsewhere, which is covered over, and on which there is to be traffic by pedestrians or wheeled vehicles, shall be covered with iron, iron and glass combined, or stone or other incombustible materials, and the beams or arch and supports of the same shall be of sufficent strength to safely carry the loads imposed thereon.

STRENGTH OF MATERIALS.

SECTION 118.—The dimensions of each piece or combination of pieces of materials required for a column of vertical support, shall be ascertained by computation according to rules given by "Haswell", "Troutwine", "Kidder" or other recognised authorities.

The strength of all columns and posts shall be computed according to Gordon's formulæ, and the crushing weights in pounds to the square inch of section, for the following materials shall be taken as the co-efficients in the said formulæ, namely:

Cast iron	80,000 pounds.
Rolled steel	48,000 "
Wrought or rolled iron	40,000 "
White oak	6,000 "
British Columbia Douglas fir	5,000 "
White pine and spruce	3,500 "

The breaking strength of wooden beams and girders shall be computed according to the formulæ in which the constants for transverse strains for central loads shall be as follows, namely:

Hemlock	400 pounds.
White pine	450 "
Spruce	450 "
Douglas fir, B. C	500 "
White oak	550 "

For wooden beams and girders carrying a uniformly distributed load, the constants should be doubled.

The factors of safety for all beams, girders and other pieces, subject to a transverse strain, when made of steel or iron shall be as one to four.

As one to four, for all posts, columns, and other vertical supports, when made of iron or steel.

As one to six for tie rods, tie beams and other pieces subject to a tensile strain, when made of steel or iron.

As one to five for other materials subject to a compression or transverse strain.

The following are the maximum loads to be imposed upon the after mentioned materials in tons of two thousand pounds per square foot:

First quality masonry, with squared beds and joints and laid in cement mortar.

Granite	60 tons.
Limestone on natural bed	40 "
Limestone where used on edge for columns and piers	20 "
Limestone rubble work in good lime mortar	15 "
Sandstone, Scotch or New Brunswick	40 "

Other stones one fourth of the crushing weight, as determined by satisfactory and recognized tests.

LOAD ON BRICKWORK.

First class brick work, of hard burned bricks, and including piers in which the height does not exceed six times the least dimensions if laid in the following manner:

One part cement, two or three parts sharp river sand	15 tons.
One part lime and three or four parts sharp river sand, and strengthened with one part of good approved cement	12 "
Lime mortar, in the proportion of one part of lime and three or four parts of sharp river sand	8 "

Brick piers of hard burnt bricks, in which the height is from six to twelve times the least dimension:

One part cement, two or three parts sharp river sand	13 tons
One part lime, three parts or four parts sharp river sand, strengthened by one part good cement	10 "
Lime mortar, in the proportion of one part lime and three or four parts sharp river sand	7 "

Stresses for material and formulæ for calculating the same, not herein mentioned, shall be determined by the best modern authorities.

PRECAUTIONS AGAINST FIRE.

SECTION 121.—In all public buildings, every storey above the ground storey shall be supplied with means of extinguishing fire, such as pails of waters or other portable apparatus, or of hose attached to a suitable water supply all as approved by the inspector, and such apparatus must be kept at all times in good condition and ready for use.

SECTION 122.—Any person owning or occupying a workshop or other building, or building in course of erection, or premises in which shavings or other like combustible materials are made, shall keep the said shop, building, or premises, as free from accumulation of such shavings, or other like materials as practicable, and shall remove all such materials at least every two days from the said shop or building, or premises. No stove shall be used in a carpenter shop, or other shop or building, used for similar purposes, unless the same shall be surrounded with fire proof material and that the pipe from the same shall be set in conformity with the provisions of this by-law.

No building of which any part is used for storage or sale of hay, straw, hemp, flax, shavings, inflammable liquid or highly combustible substances other than as permitted by section 121 of this by-law, shall be occupied in any part as a dwelling, tenement or lodging house, except that rooms for coachman or groom may be allowed in connection with private stables authorized by this by-law, by permission of inspector.

No person shall store ashes on a wooden floor, or in close proximity to any wood partition, or to any woodwork whatever. Where ashes are stored in any building, it shall only be in enclosures or receptacles made of incombustible materials.

No person shall keep, sell or explode any fire crackers within the city, nor shall any person manufacture or keep for sale any fireworks without having applied for and obtained a license or permit from the council.

No person shall set fire to any fireworks in any square or street without having obtained permission from the inspector to do so,

nor shall any person set fire to any fireworks on private property nearer to any building than forty yards.

SMOKE HOUSES AND KILNS.

SECTION 123.—No person shall use any smoke house or kiln for curing hams or for the drying of wood, or other materials, until the same shall have been inspected and approved by the inspector.

LUMBER YARDS.

SECTION 124.—No person shall use or occupy any yard or lot for the storage or sale of timber without having first applied to the council and obtained a permit to do so, as provided for in section 122 of this by-law.

FIRE ESCAPES.

SECTION 126.—Every dwelling house occupied by three or more families above the first storey, and every building already erected more than three storeys in height, occupied and used as an hotel or lodging house, and every boarding house having more than fifteen sleeping rooms above the first storey, and every factory, mill, manufactory or work shop, hospital, asylum, or institution for the care or treatment of individuals, and every building in whole or in part occupied or used as a school, or place of instruction or assembly, and every office building not of fireproof construction of four stories or more in height, shall be provided with such good and sufficient outside fire escapes, stairway or other means of egress in case of fire, as may be approved of or directed by the inspector.

Such fire escapes shall consist of an iron stairway with a suitable railing, and shall be connected with the interior of the building by doors and windows, and shall have suitable landings at every storey above the first, including the attic, if the attic is used as a work-room; and they must be kept in good order and free from any encumbrance or obstruction whatever.

The inspector shall have full and exclusive power and authority within the said city to direct fire escapes and other means of egress to be provided upon and within aforesaid buildings, in addition to any provision heretofore made.

The owner or owners of any building upon which a fire escape is erected shall keep the same in good repair and properly painted, and the occupant of such building shall keep it free from encumbrance of any kind whatsoever.

SECTION 127.—In case of the falling of any building or part of a building, where persons are known or believed to be buried under the ruins, it shall be the duty of the building inspector, immediately after being notified thereof, to engage men to search for and recover the bodies of the killed or injured, and the city treasurer is hereby authorized to defray the expense incurred by the building inspector for that purpose, and all expenses incurred in so doing shall be recovered from the owner of such building, in any court having jurisdiction in the matter.

PLUMBING WORK.

I.

SECTION 129.—No person, firm or corporation shall engage in or work at the business of plumbing, either as a master or employing plumber, unless such person, firm or corporation, has received a license or certificate therefor in accordance with the provisions of this by-law relating to these, as hereinafter contained.

II.

The word "Master Plumber" as used in these regulations, shall be deemed to mean one who employs practical plumbers or journeyman plumbers, and who keeps a shop or place of business for which he pays a business tax to the city.

III.

Any person engaged in or working at the business of plumbing, prior to the passing of this by-law, and desiring to engage in or work at said business, either as a master or employing plumber in the city of Montreal, shall apply to the board of examiners hereinafter provided for, to be examined as to his qualifications for such business.

IV.

In case of a firm or corporation, the examining and licensing of and granting a certificate to any one member of the firm or the manager of the corporation, shall satisfy the requirements of this by-law.

V.

There shall be a board of examiners of plumbers, consisting of the building inspector or his assistant, the sanitary engineer (who shall be ex-officio), and a master plumber of at least ten years' practical experience, to be appointed by the city council, on the recommendation of the Master Plumbers' Association of Montreal, for the term of two years at a time. Said third member to receive as compensation for his services a sum not exceeding five dollars a day for actual service.

VI.

The said board of examiners shall then appoint a chairman, and designate the time and place for the examination of all applicants desiring to engage in the business of plumbing within the city of Montreal. Said board shall examine said applicants as to their practical knowledge of plumbing, house drainage, and plumbing ventilation and shall submit the applicant to some form of practical tests, and if satisfied of the competency of the applicant, shall so certify and issue a license, authorizing him to engage in the business of plumbing in Montreal, either as a master or employing plumber.

VII.

The fee for a license shall be two dollars for a master or employing plumber, and said license shall be renewed yearly, on the payment of one dollar for master or employing plumbers.

PLUMBING, DRAINAGE, AND VENTILATION OF BUILDINGS.

SECTION 130.—Every licensed master plumber, or drain builder, or drain layer, shall be required to register his name and place of business at the office of the Board of Health, and to give notice at the said office in case of the removal of his place of business.

An official list of such plumbers, and drain builders, or drain layers recognized by the Board of Health, shall be published once a year during the month of May.

It shall be unlawful for any person to carry on the trade of plumbing or drain making in the city of Montreal, unless licensed or registered as above.

SECTION 131.—All plumbing and house drainage and ventilation in the city shall be made and constructed in accordance with the following rules, which shall be binding on all parties concerned.

No drains shall be made or plumbing work done in any building until a permit to do so has been obtained from the sanitary engineer, as provided for in section 22 of this by-law.

No alteration of drains or plumbing work in any building affecting its sanitary condition shall be undertaken before giving notice to the sanitary engineer. Forms of application and specification for the drains and plumbing work of a new building and for a new building and for alteration of the same in old buildings, will be supplied by the Health Department.

Pipes, drains and plumbing work shall not be covered or concealed from view until approved by the inspector, who shall examine the same within two working days after notice that they are ready for inspection.

The material used shall be of good quality and free from defects, and the work shall be executed in a thorough and workmanlike manner.

SECTION 132.—The arrangement of the soil, waste and ventilation pipes shall be as perpendicular and direct as possible.

The soil, drain, waste and drain ventilation pipes shall, as far as practicable, be exposed to view, ready for inspection and for convenience in repairing.

When necessarily placed within partitions or recesses of walls, soil, drain, waste or ventilation pipes shall be covered with woodwork, so fastened with hinges or round headed screws, as to be readily uncovered.

SECTION 133.—Every house or building shall be separately and independently connected with the street sewer, in front of such house or building, or with such other sewer as shall be designated by the board of health; but in all cases of dwelling houses there shall be a special connection with the street sewer for each fifty feet frontage of said house, if there be only six dwellings in the said space; and in case there shall be more than six dwellings in the said space of fifty feet, the special connection with the street shall be as directed by the board of health.

SECTION 134.—Interior house drains when above ground shall be of cast iron pipe; when laid under ground may be of vitrified clay pipe with a fall of at least ¼ inch to the foot; where water-closet discharge into them, the pipe shall be at least 4 and not more than 6 inches in diameter, and be laid in a straight line if possible. All changes in direction shall be laid with curved pipes and at least one clean-out length shall be provided. All drain pipes laid in the ground must have a solid foundation. When necessary, concrete made with cement, must be used.

Every such drain put in and covered, without due notice to the health department, shall be uncovered within 24 hours, for inspection by the sanitary engineer or his representative.

SECTION 135.—No brick, sheet metal, earthenware or chimney flue, shall be used as a sewer ventilator, or to ventilate any trap, drain, soil or waste pipes.

SECTION 136.—Soil pipes shall be of cast iron of the weights specified in section 144, and shall extend at least two feet above the highest part of the roof, or coping, undiminished in size, and in no case shall they be less than four inches in diameter; where the soil ventilating pipes come within fifteen feet of any windows, open louvres, or other openings, they must be carried up 5 feet above top of such window or opening.

Soil, waste and vent pipes, in an extension, shall be carried above the roof of the main building when they are closer than 20 feet to the windows of the main building of adjoining houses.

SECTION 137.—All water closet traps must be amply back air ventilated with a pipe from 2 inches to 4 inches, or other approved device, or the pipes must he so arranged as to prevent syphoning.

SECTION 138.—Joints of sewers and soil pipes shall be gas and water tight.

SECTION 139.—When stacks of pipe are required for sinks only they shall be carried through the roof, and be not less than 2 inches for four sinks or 3 inches for over that number; but the portion above the roof in all cases must be 1 inch greater diameter than that below the roof.

SECTION 140.—When lead pipes are used to connect fixtures with vertical soil or waste pipes, or to connect traps with vertical vent pipes, they shall not be lighter than six pounds sheet lead to the square foot.

SECTION 141.—There shall be no traps in connection with vertical soil or waste pipes.

SECTION 142.—All pipes shall be soued and free from holes or cracks.

SECTION 143.—The following weiglit per lineal foot or yard, for cast iron and lead pipes, are the minimum weights:

IRON PIPES.

FOR PLUMBING WORK.—2-inch, 4 pounds per lineal foot; 3-inch, 6½ pounds; 4-inch, 9 pounds; 5-inch, 12½ pounds; 6-inch, 17 pounds.

FOR DRAIN WORK.—4-inch, 13½ pounds per lineal foot; 5-inch, 17 pounds; 6-inch, 20 pounds.

LEAD PIPES.—1¼-inch, 1½ pounds per lineal foot; 1½-inch, 2 pounds; 2-inch, 2½ pounds; 2½-inch, 4½ pounds; 3-inch, 5½ pounds; 4-inch, 7 pounds.

FOR WASTE SINK PIPES.—2 inch, 10 pounds per lineal yard; 3 inch, 15 pounds per lineal yard.

Lead waste pipes, bonds or cess-pools, shall be equal to not less than 6 lbs. per square foot of sheet lead.

The fittings used in connection with such pipes shall correspond with them in weight and quality.

SECTION 144.—Plumbing work shall not be used unless the same has first been tested in the presence of the inspector, or his representative, with the water test, or if that is not practicable, with the peppermint, smoke or other reliable test, and if said test is satisfactory, he shall issue a certificate to that effect.

The Water Department, for the purpose of such test, shall temporarily turn on the water, and shall only permanently turn on the water when the certificate of the inspector is produced.

When defective pipes are discovered, they shall be removed and replaced by sound pipes; defective joints shall be made tight, and every part of the work in which defects are found shall be made to conform to the present rules.

SECTION 145.—Joints in iron drain, soil and waste pipes, shall be filled with oakum and lead, and hand caulked, so as to make them gas tight, and they shall not be painted, varnished, tarred or puttied over until after inspection, unless the inspector or his representative does not signify his approval or disapproval of the work within 36 hours after the department shall have been notified that the work is ready for inspection; the said joints may also be screw joints; should the work prove to be satisfactorily executed in the judgment of the inspector or his representative, he shall grant a certificate to that effect to the person concerned.

SECTION 146.—All connections of lead with iron pipes, shall be made with a brass or copper sleeve or ferrule of the same size as lead pipes, put in the hub of branch of the iron pipe and caulked with lead; and the lead pipe shall be attached to the ferrule by a wiped joint.

All connections of lead pipes shall be by wiped joints.

SECTION 147.—No tile pipe shall be connected with the soil or waste pipe, unless the same be provided with a flange to admit of a proper connection being made.

SECTION 148.—Every water-closet, urinal, sink, basin, wash tray, bath, and every tub shall be separately and effectively trapped. This rule shall apply to a set of tubs, but only one trap shall be required for the set.

Traps shall be placed as near the fixtures as practicable, and in no case shall they be distant more than two feet from the fixtures.

There shall be only one trap under the water-closet and that immediately beneath the same.

SECTION 149.—The connection between iron and tile pipes shall be made with best cement, or by any other means approved by the inspector.

SECTION 150.—All waste pipe fixtures other than water-closets shall be provided at the inlet of such fixtures, with strong metallic strainers to exclude from such waste pipes all substances likely to obstruct them.

SECTION 151.—In no case shall the waste pipe from a bath, tub or other fixture be connected with a water closet trap.

SECTION 152.—Overflow pipes from fixtures shall in every case be connected with the inlet side of the trap, and above the water.

Drip or overflow pipes from the safety pan under water closets and other fixtures, or refrigerators, or from tanks, other than those of water closets, shall be made to run into some place open to sight; and in no case shall any such pipe be connected directly with the drain, waste or soil pipe.

SECTION 153.—Each water-closet apartment shall be ventilated by means of a shaft or air duct extending 3 feet over the roof, and not less than 6 inches in diameter.

SECTION 154.—Every water-closet shall have a cistern supply, and in no case be supplied directly from the city reservoir supply pipes.

SECTION 155.—In houses containing one, or more than one family, there shall be a water closet for each family, and a separate cistern for each closet; in other buildings, however, a group of closets may be supplied from one tank, but not water-closets on different floors; and at least one water-closet to every 15 inmates.

In buildings where operatives of both sexes are employed, proper separate accommodation shall be furnished for men and women.

SECTION 156.—The overflow pipes from water-closet cisterns shall discharge into an open sink, or the basin of the water-closet or where its discharge will attract attention, and indicate whether waste of water is occurring, but not into the soil or waste pipe, or into the drain direct.

SECTION 157.—Valves must be so fitted and adjusted as to prevent wasting of water.

SECTION 158.—No privy vault or cesspool for sewage shall be permitted in any part of the city.

SECTION 159.—No steam exhaust blow off pipe shall connect with a sewer directly, or any house drain, soil pipe, or waste pipe; such pipe must first discharge into a tank or condenser.

SECTION 160.—Cellars shall not be connected with the house drain, unless absolutely necessary, and by special permission of the department, and according to plans approved of by the department.

SECTION 161.—A sub soil drain shall be provided when absolutely necessary, and shall be constructed and trapped to the satisfaction of the department.

SECTION 162.—No trap shall be permitted between the house drain and the public sewer, unless such trap shall have a hand hole for cleaning purposes, and a fresh inlet air pipe, the whole as may be decided upon by the department.

SECTION 163.—Drains in yards shall, in all cases, be trapped below frost, that is to say, four feet at least under ground.

SECTION 164.—In the case of a new house being built, or one already existing being repaired, wherever there is a public sewer in the street, a water closet shall be put in, to the exclusion of privy pits.

SECTION 165.—The inspection of drains within the line of street shall be under the exclusive control of the department.

SECTION 166.—Gas companies are obliged to place a stop cock to every main pipe.

SECTION 167.—Any person contravening any of the provisions of this by-law, from sections 131 to 168 inclusive, shall be liable to a fine, and in default of immediate payment of said fine, and costs, to an imprisonment; the amount of said fine, and the term of said imprisonment to be determined by the Recorder's Court, at its discretion; but the said fine shall not exceed forty dollars and the term of imprisonment shall not exceed two calendar months; the said imprisonment, however, to cease at any time before the expiration of the period fixed upon by the Recorder's Court, on payment of said fine and costs; and where the infraction is continuous, such infraction during each day shall constitute a separate offence.

RULES GOVERNING THE INSTALLATION OF ELECTRIC APPARATUS, ETC., FOR ELECTRIC LIGHT, POWER AND HEAT.

SECTION 168.—All the electrical apparatus, wires, etc., for the generation or supply service in any central station or isolated plant, and all wires, lamps, motors, etc., used for light, power or heat in any public or private building, shall be installed according to and in conformity with the rules and regulations of the Canadian Association of Fire Underwriters, and in order to secure conformity to said rules and regulations, all such installations shall be subject to inspection and issuance of a certificate to that effect from the electrical inspection department of the city of Montreal. In order that proper inspection may be made, due notice shall be given the building inspection office of any intention to install any such electrical wires or apparatus for the purposes herein mentioned, in order to allow of inspection of the installation as the work progresses, and before any portion of the work is covered or concealed, and no installation shall be considered complete and in conformity with said rules and regulations until a certificate shall issue from the inspection department to that effect. In all cases, the inspection department shall have power to decide and determine whether such work has been done in a safe and proper manner, and the issuance of a certificate therefor shall be in evidence thereof.

All materials, switches, wire or any other auxiliary apparatus or device pertaining to said installations shall be subject to the inspection department before being used for such purpose.

All wires of any description, either for telegraph, telephone, electric light, heat or power, on, or entering any building, public or private, shall be subject to the supervision of the inspection department, and with power on the part of said department to compel the placing of those wires in a proper and safe manner.

All theatres and all public halls for scenic display shall be subject to inspection at least once a year.

In case of any installation, already in operation, either of generating plant, motors, wires, or other electric apparatus located in any building or premises, becoming defective to such an extent as to threaten immediate danger to life or property, the inspection department, having notice thereof, shall have immediate power to suspend the operation of such pending the necessary repairs.

The said inspector shall, at proper hours, have the right to enter any building or premises where electric power or light is being used, to inspect all electrical wires or apparatus, in order to ascertain if the proper regulations have been complied with, and no person shall refuse to allow such inspection.

No alterations or change shall be made in the plan of wiring any building without notifying the building inspector and securing a permit therefor, and subjecting the plan of wiring to inspection as herein provided.

PENALTY.

SECTION 169.—Any person violating or contravening any of the provisions of this by-law, for which a penalty is not hereinbefore provided, or disobeying the orders of the said inspector, or refusing or neglecting to comply with such orders, or opposing or obstructing the same in any way whatever, or preventing the said inspector or assistant inspector from entering into any house, or on any premises, or assaulting him or them in the execution of the duties and powers imposed upon him and them, in and by the present by-law, shall for each offence be liable to a fine, and in default of immediate payment of the said fine and costs, to an imprisonment, the amount of said fine and the term of said imprisonment to be fixed by the Recorder's Court at its discretion, and any person who shall violate any of the provisions of this by-law shall be liable to the penalty mentioned in this section for each and every day that such violation or contravention shall last, which shall be held to be a distinct and separate offence for each and every day as aforesaid, provided that such fine shall not exceed forty dollars, and the imprisonment shall not be for a longer period than two calendar months, for each and every offence as aforesaid; the said imprisonment, however, to cease at any time before the expiration of the term fixed by the said Recorder's Court, upon payment of the said fine and costs.

REPEAL.

SECTION 170.—Any by-law or part of by-law contrary to, or inconsistent with any of the provisions of this by-law, is hereby repealed, except in cases wherein the city council has adopted, or may hereafter adopt resolutions regulating the buildings in certain streets.

MANUFACTURES AND MATERIALS

CANADIAN BUILDING MATERIALS.

FROM the Annual Report of the Ontario Bureau of Mines for 1899, recently published, has been extracted the following statistics showing the extent of the production of building materials in the province of Ontario:

SUMMARY OF PRODUCTION IN 1898.

Product.	Quantity.	Value.	Employes.	Wages.
Building stone, rubble, etc..		$750,000	1,250	$520,000
Cement, natural rock, brls...	91,528	74,222	85	23,784
Cement, Portland, brls.....	153,348	302,096	220	104,350
Lime, bushels.....	2,620,000	308,000	548	127,000
Drain tile, number.....	22,668,000	225,000	2,622	456,000
Common brick, number.....	170,000,000	914,000		
Pressed b'k & terra cotta, nbr.	8,969,868	100,344	126	42,580
Sewer Pipe.....		93,717	77	26,260
Pottery.....		155,000	164	61,000

Statistics of building materials were not collected for the year 1897, and for that year the comparative tables which follow for the period 1891-8 are incomplete. The years of depression had seriously affected the building trade, and production fell off steadily for some time. But with the revival there is a brisker demand for building materials, and it is noticeable also that there is a more generous response to the request for statistics.

The total number of men employed in the production of building materials last year was 4,611, the amount of wages paid for labor was $1,168,240, and the value of materials produced was $2,378,611. In these statistics cement is not included. This industry employed last year 305 men, with wage earnings of $128,134, while the value of the product of their labor was $376,318.

The following table gives the value of the products of stone quarries and the amount of wages paid for labor for each year of the period 1891-8, exclusive of 1897:

Year.	Value.	Wages.
1891.....	$1,000,000	$520,000
1892.....	880,000	730,000
1893.....	721,000	464.000
1894.....	554,000	336,700
1895.....	438,000	296,000
1896.....	394,000	273,000
1898.....	750,000	520,000

The number of men employed at the quarries last year was 1,250, or 480 more than in 1896.

Brick and tile works are correspondingly active, and the output of the yards is but little short of the best year in the decade. Following are the figures of production and value for the seven years, and the amount of wages paid for labor—the quantities of brick and tile being given in millions:

Year.	Brick M.	Value.	Tile M.	Value.	Wages.
1891.....	160,000	$950,000	7,500	$ 90,000	$432,000
1892.....	175,000	980,000	10,000	100,000	445,000
1893.....	162,350	932,500	17,390	190,000	451,000
1894.....	131,500	690,000	25,000	280,000	388,000
1895.....	126,245	705,000	14,330	157,000	364,000
1896.....	105,000	577,000	13,200	144,000	306,000
1898.....	170,000	914,000	22,668	225,000	456,000

The number of workmen employed in brick and tile yards was 2,622, or nearly 800 more than in 1896.

Separate statistics are given for pressed brick and terra cotta, and as will be seen by the following table for the eight years 1891-8 there is little sign of revival in the production of these materials. Two or three of the works had been closed down owing to lack of demand for pressed brick, but work has been resumed at one or two of these and it is likely that the output of this year will show an increase.

Year.	No.	Value.	Wages.
1891.....	13,617,909	$156,699	$58,000
1892.....	22,048,000	259,335	88,865
1893.....	21,634,000	217,373	80,886
1894.....	25,456,000	286,230	95.400
1895.....	17,940,867	184,550	69,142
1896.....	12,201,000	129,845	60,824
1897.....	8,043,908	99,277	40,084
1898.....	8,969,868	100,344	42,580

The number of men employed at the works last year was 114, being 29 less than in 1897.

The statistics of lime production show an increase in

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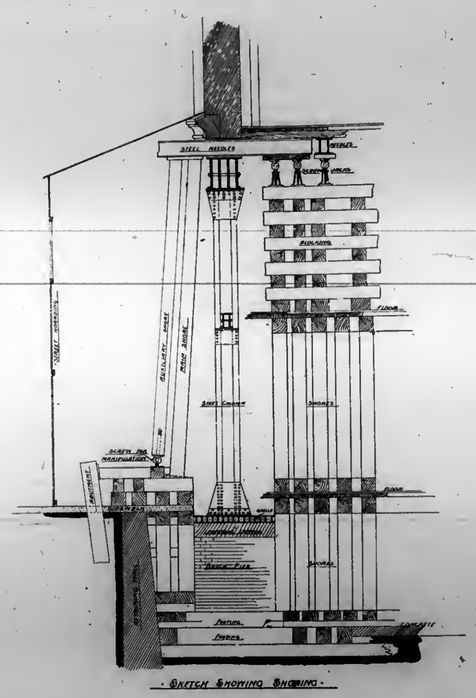
PERSPECTIVE VIEW BEFORE ALTERATION.

PERSPECTIVE VIEW AFTER ALTERATION.



KEY SKETCH.

ILLUSTRATIONS ACCOMPANYING PAPER IN THIS NUMBER BY MR. J. WILSON GRAY, ARCHITECT, DESCRIBING THE METHOD OF MAKING IMPORTANT ALTERATIONS TO THE CONFEDERATION LIFE BUILDING, TORONTO.

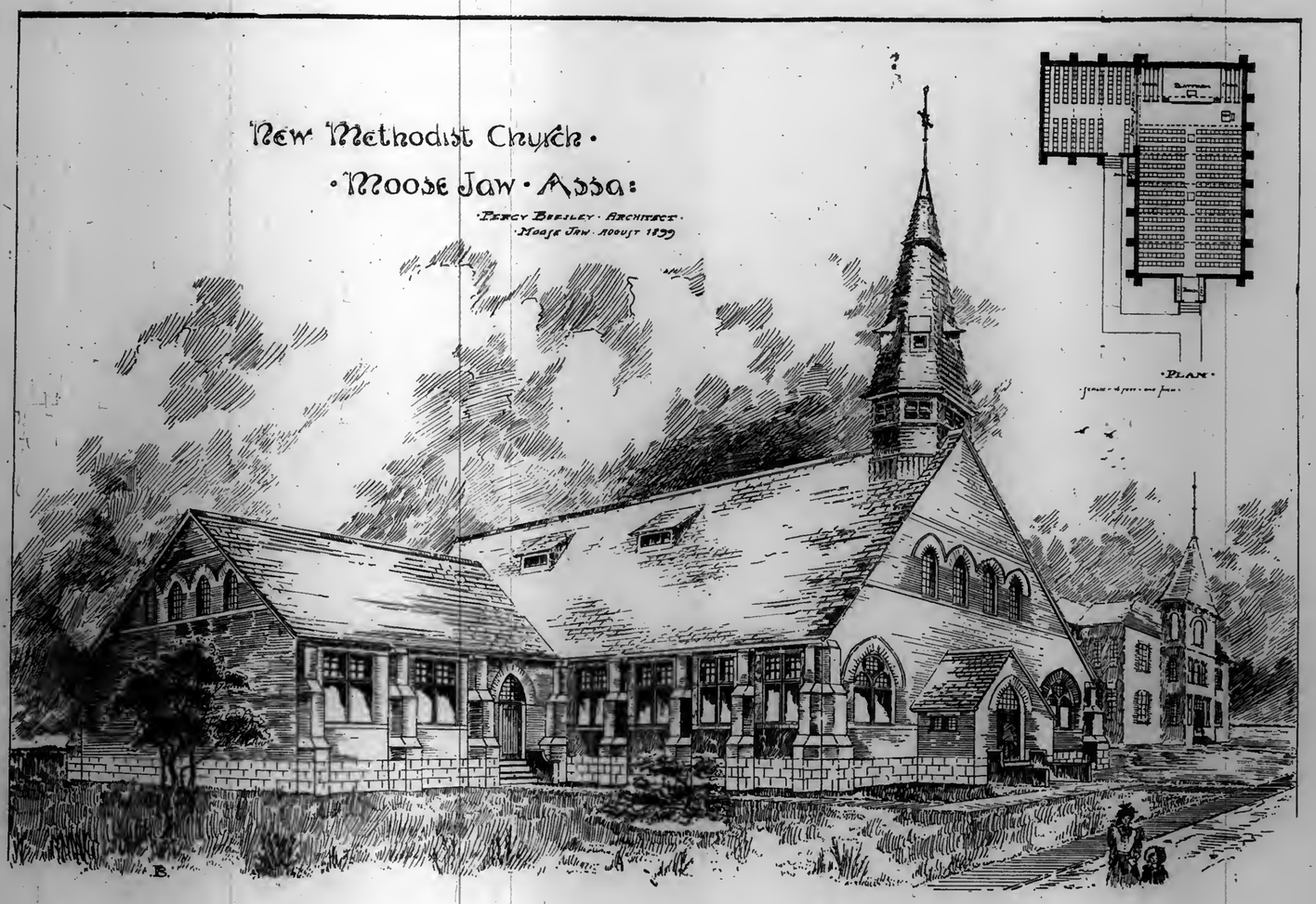

New Methodist Church.
Moose Jaw. Assa.
Percy Beesley. Architect.
Moose Jaw. August 1909
Plan.

FIG. 3.

FIG. 4

FIG. 5.

FIG. 6.

FIG. 1.

FIG 2.

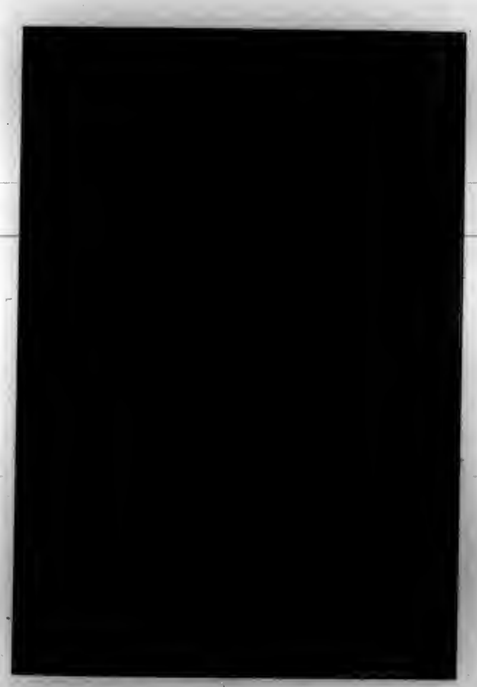


FIG. 7.

FIG. 8.

ILLUSTRATIONS ACCOMPANYING PAPER IN THIS NUMBER BY MR J. WILSON GRAY, ARCHITECT, DESCRIBING METHOD OF MAKING IMPORTANT ALTERATIONS TO THE CONFEDERATION LIFE BUILDING, TORONTO.

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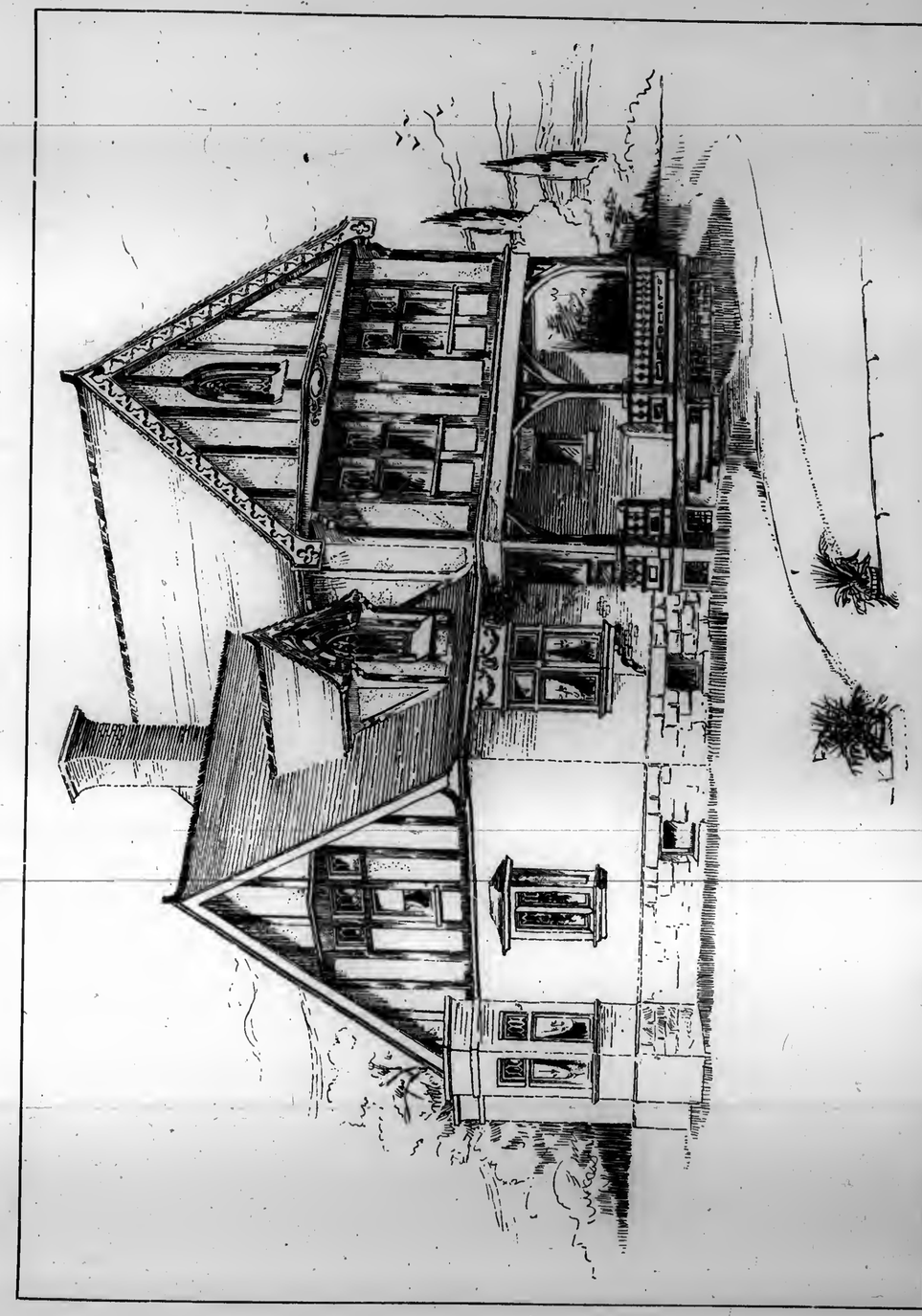
T. C. SORBY, ARCHITECT.



DESIGN FOR RESIDENCE AT HAMILTON, ONT.
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CANADIAN ARCHITECT AND BUILDER.

VOL. XIII.—No 1. JANUARY, 1900 {PRICE 20 CENTS. $2.00 PER YEAR.

—THE—
CANADIAN ARCHITECT AND BUILDER,
A Monthly Journal of Modern Constructive Methods,
(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD).

PUBLISHED ON THE THIRD WEDNESDAY IN EACH MONTH IN THE INTEREST OF
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The C. H. MORTIMER PUBLISHING CO. of Toronto, Limited, Publishers,
Confederation Life Building, - TORONTO, CANADA.
Telephone 2362.

Branch Office: NEW YORK LIFE INSURANCE BUILDING, MONTREAL.
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SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to foreign subscribers is $2.50. Subscriptions are payable in advance. The Journal will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrears of subscription paid.

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Legislation Affecting Builders.

THE builders' organizations of New York and Buffalo have appointed a committee whose duty it will be to watch all new legislation and prevent the enactment of measures which would operate to the disadvantage of the building industry. This is an important step in the right direction which should be taken by the various builders' exchanges in Canada.

Destructive Effects of Earth Currents.

ENGINEERING, of London, in a recent article, refers to the disturbance caused at St. John's College, Oxford, by stray currents emanating from dynamos in the building. Reference is also made to the Toronto Observatory, where the delicate recording mechanism was so seriously affected by the current employed on the street railway lines 700 feet distant, that removal to new location several miles east of the city became necessary. In the construction of the new building the stone was mechanically tested, blocks showing traces of iron being rejected. In the Cavendish laboratory at Cambridge, even the hot water pipes are made of copper. Notwithstanding every precaution, however, it is stated that several of the prominent observatories, including the national institution at Greenwhich, are seriously affected. The most certain remedy, although a costly one, is that adopted by the Toronto Observatory. The purpose

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of the Toronto Railway Co. to weld together the ends of the rails throughout their entire system, should greatly lessen the escape to earth of return currents and the destructive effects of the same. Engineering suggests that a remedy may also be found in the use of aluminum conductors, but of this we are not sanguine, as aluminum is not well adapted for use in cities, where the injury from earth currents is greatest.

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Students' Competition.

ARCHITECTS are requested to direct the attention of their students to the competition, particulars of which are given in the Students' Department of this number. It is hoped that there will be manifested such an interest by the students in this competition as that we shall feel encouraged to provide for others of a similar character. Architects who feel an interest in the advancement of their students, should direct their attention to this competition and urge them to enter. The subject should be a particularly interesting one to young men, most of whom will no doubt be quite familiar with the requirements. Let none be deterred from engaging in the competition by what may appear to them to be the difficulty of the problem. Whether they should chance to win or fail, they will greatly profit by the time and study which they will have devoted to the subject.

Building in 1899.

PRESSURE upon our space prevents the publication of a detailed statement of building operations in Canada during 1899. The reports to hand, however, show that great activity prevailed and that in the cities and more important towns improvement was the order of the day. This is a natural result of the prevailing commercial prosperity. The extent of building improvements was considerably reduced, however, by the impossibility of securing necessary supplies of structural steel. The unprecedented rise in price of certain lines of staple materials, the increased rate of wages and reduction of hours demanded by artisans, made it difficult for contractors to obtain a fair margin of profit on their undertakings. As an offset the unusual mildness of the weather has permitted operations to be continued almost without interruption until the present, and there can be but a short gap between the seasons. The outlook appears to be very satisfactory.

The Ontario Association of Architects.

THE convention of the Ontario Association of Architects held in Toronto last week, the full proceedings of which will be found in this number, was one of the most important in its history. It was realized that the time had come when radical changes in the policy and plans of the Association were required. Several recommendations of the Consulting Committee were in line with suggestions presented of late in these columns. The Association also received with courtesy and consideration the opinions and suggestions of the 18 Club, and the members of that organization were cordially invited to join hands with the Association in carrying into effect the necessary reforms. There was a general agreement of opinion that a system of education for students should be an important feature of the future work of the Association, and that it be made a condition of studentship that students shall pursue the course of study and pass the qualifying examinations prescribed by the Association. This policy, if strictly adhered to, must result in great advantage to the students and the cause of Architecture. The proposal to adopt the atelier method of instruction for students is a valuable and perfectly feasible one. The decision to have as the headquarters of the Association suitable rooms in the central part of the city is a necessary feature of the educational scheme and should bring into closer relationship the members and students. If as Mr. Hynes stated, one of the exhibitions under the direction of the Architectural League of America can be brought to Toronto next year no time should be lost in arranging the matter. The holding of such an exhibition in Toronto would awaken in the profession, the students and the public, an interest and enthusiasm in Architecture which must conduce to progress and the welfare of the Association. This important matter should not be lost sight of, nor should action with regard to it be delayed, lest the opportunity be lost. It is to be hoped that the joint committee of the Association and the 18 Club, appointed to consider in detail what should be the plan of action for the future, will get to work immediately and be able to see eye to eye, and that in consequence all the members of the Club will shortly connect themselves with the Association and assist in its upbuilding and the advancement of Architecture in Canada. If this course be taken, the future is full of promise.

BY THE WAY.

THE project for the erection of a palace hotel in Toronto seems to have dropped out of sight. In view of the recent advance in the rate of interest it would seem that the promoters of this enterprise have lost tor a time their opportunity.

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IN the construction of modern tall buildings in which stone and brick are employed as covering for the steel skeleton, it has become the practice in Pittsburg and New York to carry forward the brickwork of the upper stories simultaneously with the masonry on the lower stories. By this method a large saving in time is affected.

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THE Mayor and City Commissioner of Baltimore have recently defined the difference between a bow and a bay window. Bow windows are defined as those used by merchants in displaying their goods, and bay windows are those placed on private dwellings for purposes of adornment or comfort. An annual rental, according to locality, will be imposed on the former, while the latter must be paid for outright.

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A NEW method of employing Portland cement is in connection with the rehabilitation of dilapidated frame buildings, the foundations of which are good. The modus operandi consists of refinishing the walls in wood and then covering the entire outside of the building except door and window openings with expanded metal, on top of which is laid a coat of Portland cement mortar, finished in any suitable manner. This method of reconstructing old buildings has been employed for a number of years in San Francisco and of late has been adopted in Chicago.

The governments of Nova Scotia, New Brunswick, and Prince Edward Island, are considering the establishment of a School of Technology at some convenient point in the Maritime provinces.

WALTER SHANLY.

WITH the death of Mr. Walter Shanly, at Montreal, on December 17th last, there passed out of life an interesting personality. The late Mr. Shanly was widely known, not alone as an eminent engineer, but as one who once occupied a distinguished place in the commercial and political life of the nation. Born in Queen's County, Ireland, in 1819, he came with his father to Canada when a youth of 17, and adopted the engineering profession. He was employed on the Beauharnois and Welland canals and on American railways until 1850. In that year he became engineer of the Ottawa and Prescott Railway, in 1851 engineer of the western division of the Grand Trunk Railway, and in 1858 general manager of the latter system. In conjunction with his brother, the late Frank Shanly, he built the celebrated Hoosac Tunnel. His advice was highly esteemed as a consulting engineer in connection with many important undertakings. He was for some years president of the Mechanics' Bank, and was a member of the delegation of representative Canadians to the Detroit Trade Convention of 1864. From 1863 until Confederation he was a member of the old Parliament of Canada,

THE LATE MR. WALTER SHANLY.

and sat in the first, fifth and sixth Parliaments after Confederation. He was a life-long friend and supporter of the late Sir John Macdonald. His remains were interred at London, Ont.

T SQUARE CLUB OF PHILADELPHIA.

We have received from this Club the catalogue of their exhibition of 1899-1900. It is a really valuable publication, and the T Square Club is an institution to inspire hope for the future—the near future—of American architecture. It describes itself as "a working man's club," but the bond seems to be more than merely a common profession; there seems to be a common aim—to follow lines not of convention but of development. In the exhibition to which this catalogue is a guide they have got together a collection of drawings by American, English, and a few French architects, which represent work in a diversity of manner, but all good of its kind, and some of the drawings are wonderful. This collection of drawings, (505 in number, of which about 120 are reproduced in the catalogue,) appears to travel from town to town, between affiliated clubs, during the year. The drawings are evidently selected with great care, either by a hanging committee or in the first instance at the office of the exhibitors. The travelling representatives in England and France have no doubt had the opportunity of marking their catalogues at exhibitions in London and Paris and afterwards begging from the exhibitors the selection thus made. The circuit of the drawings in this collection is arranged by the Architectural League of America, which seems to be a machine for obtaining combined action upon points of common interest by architectural clubs or societies of diverse character.

Whatever the other clubs of the league may be like, there is life in the T Square Club. They have besides this annual exhibition a travelling fellowship for which is appropriated "a sum to be spent in a few months of European travel under the direction of the Club." The competitive test for the fellowship is not an examination, but a series of competitions upon the same theme. Each competition is upon a part; the plan, elevations, the grouping of parts, the grasp of the problem as a whole. In the last two competitions improvements on the original design are allowed which would naturally be suggested in the process of making the drawings, and for the sake of which such drawings are, in actual practice, made. Each competition is judged by itself independently but the award is made on the average for the year; that is to say upon the whole effort. The subject for this year, a Semi-Suburban Residence near Philadelphia, is characteristic of the Club. Last year there was incorporated with the catalogue a number of letters from prominent architects of the United States, in answer to an enquiry as to the possibilities of "an unaffected school of modern architecture in America." The competition this year offers a local, practical problem exactly calculated to direct the efforts of draughtsmen in the way of the modern development of old motives which should be the way by which an unaffected school of modern architecture will grow.

The T Square Club works not only at the art of architecture but takes a hand also in efforts to establish system and morale in dealings between the profession and the public, especially in the matter of competitions; and it is endeavoring to procure competition for certain public buildings in various cities and towns of Pennsylvania under the operation of the Tarsney Act which gives discretionary power to the Secretary of the Treasury to select local architects to enter into competition for such buildings.

Here is a live Club in the best sense; it is alive in the right directions. It is pleasing to see that there are two contributors from Toronto to the exhibition. We may perhaps hope that not only the aims of the Club are growing our way but the circuit of the exhibition of drawings.

NOTES.

The Trades Unions of Chicago have become so unreasonable in their demands that the architects and contractors of that city are said to have joined hands for the purpose of breaking up the power of the walking delegates.

The city council of Ottawa have appointed the Mayor as the city's commissioner on the board which is to control the expenditure of the grant of $60,000 per year voted by the Government for public improvements within the city.

The city solicitor of Toronto has been instructed to memoralize the courts to declare the Elliott & Neelon contract for the erection of the city hall closed, and to give a winding-up order which would permit of the disposal of the plant.

At the last meeting of the Provincial Board of Health of Ontario it was decided to investigate the need for adopting accurate and systematic means of ventilation for schools and other public buildings. The result of the enquiry will be reported at the next meeting.

The report of the Committee appointed by the Ottawa Board of Trade to consider what amendments should be made to the Building By-law of that city, came up for consideration a second time recently and gave rise to a somewhat heated discussion. The President of the Board was strongly in favor of the adoption of the report as printed in the CANADIAN ARCHITECT AND BUILDER for November. Several of the city architects also supported the report, which, however, was strongly opposed by some of the local contractors. It was ultimately resolved that it should be again referred back to the Committee for revision.

Mr. John M. Byrens, architect, of New Westminster, B.C., has invented a device called a "storm lath" for the purpose of shutting out draughts from windows. It consists of a strip of zinc an inch or two wide, which, on being passed through a specially manufactured machine comes out with a V-shaped ridge down the centre. This is then fitted tightly into the window frame, if desired, on the sides as well as across the sill and the top, and when the window is lowered this joint fits snugly into a corresponding groove in the edge of the window. By its formation a small air chamber is formed, which has the same effect as double windows. A company has been organized and has commenced the manufacture of the device in New Westminster.

ILLUSTRATIONS.

CITY HALL, STRATFORD, ONT.—J. W. SIDDALL, ARCHITECT.

BUSINESS PREMISES, KING STREET WEST, TORONTO, FOR MESSRS. JOHN KAY, SON & CO.—S. G. CURRY, ARCHITECT.

NO. 87 BEDFORD ROAD, TORONTO.—W. A. LANGTON, ARCHITECT.

This house, at the south-east corner of the junction of two streets, is on a lot of which the greatest length is east and west. The house is kept at the outer end of the lot, so as to keep the land which is not built upon together in one piece on the private side of the house; and it is set on the north side of the lot so as to leave a space which converts the house into a south fronting house, with its sunlight unobstructed throughout the year, and which allows a carriage to be brought up to the door. The material is red common brick toned in color by full joints of gray mortar. Sills and coping are of Ohio stone.

THE "MARLBOROUGH" APARTMENT HOUSE, MONTREAL.—MESSRS. TAYLOR & GORDON, ARCHITECTS.

The "Marlborough" apartment house is now under construction, and will be completed by the first of May. It is situated on Milton street a few yards from University street close to McGill College and with beautiful views of the mountain and has a frontage of 110 feet.

The architects of the building are Messrs. Taylor & Gordon, of Montreal, under whose supervision the work is being carried out.

The style of architecture is Elizabethan, characterized chiefly by its graceful towers, picturesque outlines and free ornament. The building is three storeys high and basement, except in the front, which is carried up another storey to provide four suites for artists, with two large, well lighted studios, each 30 x 18 feet.

The facade is carried out in red pressed brick, set off by rich cream colored sandstone trimmings. The main entrance facing Milton street is elaborately treated and finished in sandstone, effectively carved, with handsome wrought iron lamps on either side. A broad flight of marble steps in the main vestibule leads up to a spacious and well lighted entrance hall, paved with marble mosaic and completely finished in quartered oak. On the left is the waiting room, from which communication can be had to each suite by means of speaking tubes.

Opposite the waiting room is the janitor's office, where the telephone for the use of tenants will be placed.

The building is so planned that every room has direct light and air, the use of light wells of any description being entirely done away with.

The three main staircases of the building are entirely carried out in iron and marble, encased in brick walls, with all the landings finished in mosaic, thus rendering the staircases completely fireproof.

The building contains twenty-seven suites of apartments as follows: Six suites with 9 rooms each, including kitchen; six suites with seven rooms; six suites with six rooms; five bachelor suites comprising sitting-room, bed-room and bath-room. On either side of the main entrances on the ground floor are two suites suitable for doctor's offices, and on the top floor facing Milton street are the artists' studios already referred to.

In the centre of the building is a large open court, 60 feet long by 30 feet wide, which will be laid out in grass with a fountain in the centre.

The floors of all the halls and principal rooms in each suite will be of hardwood. The floors of all the public halls throughout are paved with mosaic.

The drawing-rooms and sitting-rooms of all suites have open fire-places with tiled facings and hearths and Elizabethan mantel-pieces.

Each suite is well provided with clothes closets, in addition to linen closets, store closets, etc. It is expected that the larders will be fitted up with a system of cold storage, operated by the ammonia process from the basement.

The heating, plumbing, sanitary appliances, and ventilation of the building are up-to-date in every respect.

The bath-rooms of each suite are fitted up with enamelled baths and marble basins, the hot water being supplied from the boilers in the basement.

The rooms of all suites are ventilated by means of ventilating shafts. The building is heated by hot water and lit by electricity. The tenants will find the dust-chutes provided for each kitchen a great convenience.

In addition to other conveniences, each suite is provided with an open balcony, and also store rooms in the basement for boxes, trunks, &c. There is also adjoining each stair a lift for trunks and for tradesmen's supplies, etc., with speaking tubes to the several suites.

Such are a few of the attractions and advantages of the latest addition to Montreal's apartment houses.

Mf. A. F. Gault, who is the owner, is to be congratulated upon his enterprise in providing what will undoubtedly be cosy and comfortable homes, suited to the varying requirements of residents. Mr. Stanley H. McDowell, 21 St. Helen street, has charge of the enterprise in Mr. Gault's behalf.

QUESTIONS AND ANSWERS.

AN Old Subscriber writes: "There was an article in your October number, referring to a method of roof trussing, that I was rather astonished that you should have published. To my view it appears to be a very faulty piece of building construction, as the weight of the roof is thrown upon a 2" x 6" lookout, instead of directly on the walls where it should come. I, with other builders, look upon the CANADIAN ARCHITECT AND BUILDER as an educator in building construction, and hope you may continue in the good work, notwithstanding your one mistake in your October number."

ANSWER.—Evidently our correspondent has not carefully examined the truss he takes exception to, or he would have arrived at very different conclusions. The weight of the roof does not rest on the lookout as he asserts, but on the inside stud which conveys it again to the inlook which rests vertically on the wall, thus taking off all lateral thrust from the walls. The outlook and inlook combined, rest square on the wall, and the whole weight of the roof centers directly on the top of the walls with a vertical pressure. This method of half-trussing has met with favor with many American architects, and has been copied in several journals. The London Building News, one of the best building authorities in England, reproduced the illustration referred to, and gave it its great approval. If our correspondent will examine the illustration again, we are inclined to think he will change his mind.

CORRESPONDENCE.

THE TORONTO TECHNICAL SCHOOL AS AN INFORMATION BUREAU.

THE manager of a prominent manufacturing company in Toronto writes as follows:

"Understanding that the Toronto Technical School was organized and maintained for the purpose of encouraging manufacturers, I some time ago thought I was justified in asking from a member of the faculty information on a small matter that neither myself or our engineer understood thoroughly. I accordingly on the 18th of November last addressed a letter to the Lecturer on Physics, Toronto Technical School, Toronto, in which I stated we took the liberty of addressing him on a small matter that had been giving us some trouble in our works. I then stated very plainly and in as few words as possible just what our trouble was, but so far (December 7) I have not had any reply. The information I wanted was a small matter in connection with heat which comes under the head of physics in the Toronto Technical School course. The question was: 'What temperature should hot moist air be reduced to to cause it to liberate the greater portion of the moisture which it contained?' On the same day I also addressed the same question to an engineering firm in Montreal, and the return mail brought the required information. Possibly the member of the faculty to whom I wrote may have considered that it was presumptuous to apply to them for information, but as the school is maintained at considerable expense to Toronto, we, as citizens, thought we were justified in making the request.

THE O.A.A. AND STUDENT EDUCATION.

TORONTO, December 28th, 1899.

To the Editor of the CANADIAN ARCHITECT AND BUILDER:

SIR,—In your editorial in a recent number of the CANADIAN ARCHITECT AND BUILDER, you refer unfavorably to the proposal of the Ontario Association of Architects to provide a travelling studentship for the students of the Association to compete for, stating that this seems like starting at the wrong end of the ladder on account of the students not having had the training necessary to qualify them to profit by such a studentship. You seem to have forgotten, or not to have been aware that it is proposed to present this studentship to the student standing highest in the examination for qualification as member of the Association. Now, as a necessary qualification is, that the candidate for membership shall be twenty-one years of age, and that he shall have served five years in an architect's office, and that he shall have passed the preliminary, intermediate and final examinations, and have shown himself qualified for membership in the Association, and for practice in the community, you will see that he will have arrived at the period of his studies at which his mind is most prepared to receive the lasting and most essential impressions which are given by a period of time spent in studying the best examples of work in any one part of Europe.

You go on to say that "the greatest requirement at present is the means of educating the student." Again I beg to differ with you, as there is no lack of the means of educating architectural students in Ontario to-day. Several courses of study are open to them for the asking, but what I have maintained and now maintain is that unless a young man can see some object or some advantage to be derived from taking a prescribed course of study under such auspices as those provided by the Association, he becomes careless and indifferent, naturally saying, "Why should I take this course of study which involves the payment of fees and the fulfilling of a lengthy course, when I can arrive at the same eventuality in my own way and by my own efforts?"

You insinuate in the same article that sufficient attention has not been given to the subject of professional education by the Association. While this is correct in a sense in another sense it is not correct, for the provisions of the Association for the course of study for students is very elaborate. The failure has been caused by the inability of the Association to promise the student protection and assistance after he has completed the course and entered into practice in the province. Now, until the Association can make this promise to the student another means must be found to induce him to take the course of study and present himself for examination, for unless he does this it must be apparent to every citizen of the community that the future generation of architects shall either have received their education abroad, or be distinctly inferior in trained ability, owing to their neglect to grasp their present opportunities, unattractive as they may seem. The presentation of a medal and the offer of a scholarship will undoubtedly bring our students into keen competition, consequently the essential course of study will be taken by all, while all cannot win the medal and studentship. This, then, I claim, is the direction in which the efforts of the Association should be made, viz.: Making the course of study attractive to students.

Trusting I am not imposing too much upon your space, and allow me to say that the interest which your paper is taking in the Association's welfare is highly appreciated by its members.

Yours truly,

REGISTERED ARCHITECT.

STRENGTH OF LEAD PIPE.

To the Editor of the CANADIAN ARCHITECT AND BUILDER:

SIR,—Referring to the article appearing in your November issue relating to resistance of lead pipes, I would be thankful to know if you do not take into consideration the section of pipe in square inch for water pressure, and should not the result 90 be divided by XR^2 giving $28\frac{7}{11}$ per square inch.

Yours truly,

L. LEMIEUX, Architect.

MONTREAL, Nov. 11, 1999.

EDITOR'S NOTE.—The corrections suggested by our correspondent are seemingly right, if the tensile strength of lead be taken at 2,159 pounds per square inch. This constant, however, is not the one in general use as most authorities give it at 2,240 pounds per square inch.

The following table of the resistance of lead pipe to internal pressure, is compiled from Kirkaldy, Jardine and Fairbairn:

Diameter.	Thickness.	Weight per foot.	Bursting pressure.	Diameter.	Thickness.	Weight per foot.	Bursting pressure.	Diameter.	Thickness.	Weight per foot.	Bursting pressure.
Inch.	Inch.	Lbs.	Lbs	Inches.	Ins.	Lbs.	Lbs.	Inches.	Ins.	Lbs.	Lbs.
.5	.2	2.3	1579	1.25	.21	5.3	683	2	.21	9.2	498
.625	.2	2.6	1349	1.5	.24	7.1	734	2	.2	....	44
.75	.22	3.8	1191	1.5	.2	....	528	3	.25	....	364
1	.2	4.1	911	1.5	.2	....	626	3	.25	....	374

Tensile strength of metal = 2240 lbs. per square inch.

TO COMPUTE THICKNESS OF A LEAD PIPE WHEN DIAMETER AND PRESSURE ARE GIVEN IN POUNDS PER SQUARE INCH.

RULE.—Multiply pressure in pounds per square inch by interna. diameter of pipe in inches, and divide product by twice tensile resistance of metal in pounds per square inch.

ILLUSTRATION.—Diameter of a lead pipe is 3 inches, and pressure to which it is to be subjected is 370 pounds per square inch, what should be thickness of metal?

$$\frac{370 \times 3}{2240 \times 3} = \frac{1110}{4480} = .248 \text{ inches.}$$

The difference in weight between pipes of common, middling and strong is 12 per cent.

THE USE OF CONCRETE FOR SIDEWALKS.

A correspondent writes: In your issue of November there is an article on concrete for sidewalks. Our town started building cement walks this year, and as chairman of streets committee I have been seeking to learn all I could in the matter. I note that your article says that the walks should be kept damp for two weeks after laying. Will you kindly give me the reason for this? We laid some walks with Hercules and Diamond cements for top course, with Hercules, White Star and Parrot brands variously for the lower course of concrete, and did not dampen the surface after it was laid, and all of it seems to have made a splendid stone-like work; that of the White Star drying the slowest. Later on in the season we laid some walk with White Star in the bottom course and White Bros. (English) for finish. The weather was cold and overcast. After the walks had been thrown open to traffic a rain came and softened the top so much that footsteps made impression. Then we covered with sawdust. Frost came and where-ever the saw-dust was light or had been kicked off and the sun afterwards got a chance at the walk, it seemed to blister and a skin-like portion of the top would peel off. That part that was covered with saw-dust seems to be gradually hardening, though the damp weather has kept the sawdust wet. But on the whole, the dampness just after laying seems to have worked disaster. Would be glad if your editor or contributor could throw light on the subject, and give the reason for advocating dampening the surface for a fortnight.

ANSWER:—The reason why it is desirable that a new cement sidewalk should be kept damp by repeated moistening with water

is to prevent its setting too rapidly. When the finishing or "topping off" coat of cement is left exposed to the dry air or to the rays of a hot sun immediately after it is finished, it is apt to "creep" and show fine hair cracks which may fill with water in the fall or spring and freeze, which action in time will loosen the cement from the concrete and cause it to scale off. The longer the cement takes to thoroughly harden, the more durable the work. Some sidewalk makers cover the finished work with canvas for a day or two, then after removing the canvas, cover the walk with a layer of damp sand which is occasionally wetted until removed in a week or so.

MR. L. R. O'BRIEN.

By the recent death of Mr. Lucius Richard O'Brien, R.C.A., a leader has been removed from the ranks of our native artists. The accompanying portrait is a reproduction from a photograph of the bust of Mr. O'Brien by Hamilton MacCarthy. Mr. O'Brien, who was in his seventieth year, was a native of the province of Ontario, having been born at Shanty Bay, near the town of Barrie. His father was the late Lieut.-Col. E. G. O'Brien, a retired naval and military officer.

BUST OF THE LATE MR. L. R. O'BRIEN, R.C.A.
By Hamilton MacCarthy, R.C.A.

After having been educated at Upper Canada College, he studied for a time architecture and civil engineering, but afterward relinquished these professions to devote himself entirely to the pursuit of art. In 1873 he was elected first vice-president of the Ontario Society of Artists, which office he held for seven years. In 1880 he was elected the first president of the Royal Canadian Academy of Art, founded in that year by the Marquis of Lorne and Princess Louise. This position he occupied for ten years. In 1895 he was elected president of the Provincial Guild of Sculpture.

Mr. O'Brien was a frequent exhibitor at the London Art exhibitions. His water color sketches of Canadian scenery, particularly in the Rocky mountains, were masterpieces. His diploma picture, "Sunrise on the Saguenay," is in the Ottawa Art Gallery. He was commissioned by the Queen to paint two pictures of Quebec. The Marquis of Lorne and the Princess Louise were also his patrons and friends.

The statue of Alexander Mackenzie, designed by Hebert, the well known sculptor, has been completed at Paris, and will be exhibited at the forthcoming exhibition in that city before being shipped to Canada.

Branch Office of the CANADIAN ARCHITECT AND BUILDER,
New York Life Building.

MONTREAL, Jan. 18, 1900.

THE RENAISSANCE CLUB.

The annual meeting of the Renaissance Club was held in the club rooms, Phillips Square, on the evening of Wednesday, December 20th. There were over forty members present. The secretary-treasurer's report was read and adopted. It showed a good balance on hand. The election of officers then took place with the following result: Prof. Capper, honorary president; David R. Brown, president; S. A. Findlay, vice-president; W. A. Price, secretary; D. J. Spence, treasurer. Committee—Mr. R. Dawson, Dr. Stewart Nicol, Dr. Tait McKenzie, Mr. J. MacAulay, Mr. K. Rea.

TESTS OF EXPANDED METAL AND CONCRETE FLOORING.

Prof. Bovey of McGill College and Mr. John Kennedy, chief engineer of the harbor board, at the request of the architects, Messrs. Hutchison & Wood, conducted a series of weight tests of the expanded metal and concrete floors lately finished in the new La Presse building. While this system of fire-proof construction is well known in other countries these are the first floors yet tested in Canada.

On an 8 by 14 foot floor, 23,191 lbs. of pig iron was piled equal to a distributed load of 240 lbs. per sq. ft. or three times the required strength and the delicate gauges recorded a deflection of 3/16 inches only. On the same floor plate a centre load of 11,580 lbs. was laid, resulting in 1/8 inch deflection. A third test was on a 6 ft. 8 in. by 15 ft. floor which took a load of 38,800 lbs. before 1/4 inch deflection was registered, being over a ton more than four times what the architects have called for. In every case upon removal of the load, the deflection disappeared.

The interesting experiments were witnessed, among others, by Hon. T. Berthiaume; Mr. F. A. Peterson, chief engineer C.P.R.; Sir Adolphe Caron; Mr. Edward Maxwell; Mr. Arthur Berthiaume; Mr. F. H. Leonard; Mr. A. Dansereau, director of La Presse; T. W. Horn, president, Mr. C. S. Spencer, chief engineer, Expanded Metal Co., Toronto, by whom the work was installed; Mr. G. W. Brunette, Mr. James Paton, Mayor Desjardins of Maisonneuve; building Inspector Lacroix; Mr. A. C. Hutchison; Mr. H. R. Ives; Mr. R. F. Ogilvy; Mr. John Baillie; Mr. William Hutchison; Mr. L. Bourgoine; Mr. L. Cadieux.

MONTREAL BUILDERS' EXCHANGE.

The Second Annual Report of the directors of the above Exchange, contains the following: "The past year has been, to some extent, an eventful one in building circles, inasmuch as a notable improvement was made in regard to the letting out of contracts and the erection of some important buildings. An unfortunate feature, and one which has seriously hampered the year's progress, was the scarcity of iron, but as it is an "ill wind that blows nobody good," the large demand for iron from this country to the United States and the inadequately small supply, has been the means of influencing large capitalists in establishing extensive iron works in our own country, thus developing our national resources.

Our Charter was granted to us by the council of the legislature under date of March 10th, and under its provisions a special meeting was called for the 27th June, at which the action of the Directors was confirmed and the by-laws adopted. At this meeting a recommendation from the board to have subcommittees appointed

to preseot the different trades, was taken up, approved of, and since acted upon. Sub-committees were formed from the following different trades, viz.: Masons, iron and steel construction, carpenters, lumber, plasterers, painters and decorators.

A matter of great importance was discussed by the meeting on 27th June, in regard to certain grievances which existed that were detrimental to the building trades. In order to have some of these adjusted, the secretary placed himself in communication on three different occasions with the secretary of the council of architects, who promised to take action on the request made by us for a conference; but so far, notwithstanding our strenuous efforts, we have been unable to secure any result from our overtures. Your board of directors would recommend to the incoming board that they seriously consider the questions relative to existing grievances, and the advisability of bringing the same to the attention of the committees of the Board of Trade and Chambre de Commerce with a view to their adjustment.

"Your board has given most careful attention to the proposed amended building by-law, and instructed the secretary to draft a letter to our city council, urging that it be pushed through as expeditiously as possible.

TESTS OF CONCRETE FLOORING.

The Montreal Gazette recently published particulars of a test of concrete flooring constructed by the Roeblings Co. in the Foley Apartment House Building, corner of Metcalf street and Dominion Square. The test took place in the presence of the architects of the building, Messrs. Saxe & Archibald; Mr. Alex. Peterson, Chief Engineer of the C.P.R.; Mr. St. George, City Surveyor; Prof. Capper, President of the Province of Quebec Association of Architects; Mr. Lacroix, City Building Inspector; Mr. A. L. A. Himmelwright, the manager of the Roeblings Construction Co.; Mr. E. D. Hofeller, of Buffalo, who represents them for western New York and Canada; E. F. Dartnell, their Montreal agent and others.

"The test arch was constructed and concreted on the 14th of October, and the requirements were that the arch was to be capable of sustaining a superimposed load of 275 pounds per square foot without cracking or failure, the deflection of this load not to crack the plaster. The floor is of concrete construction, the ingredients being one part Dyckerhoff cement, two and a half parts sand, and six parts unscreened steam ashes. A section of flooring fifty-three inches wide and sixteen feet long, between supports, was cut free from the rest of the flooring with cold chisels. Wood boxes without bottoms and with sides twelve inches high, fifty inches by sixteen feet, were superimposed over the section tested to retain the sand with which the arch was loaded. The test was begun at 11 a.m., when two cubic feet of sand were weighed and averaged ninety pounds in weight. A layer of sand one foot deep was placed in the box over the arch, and the deflection was found to be one-eighth inch, when a similar load of 120 lbs. per square foot was placed, the deflection was found to be three-sixteenth inch, and when 180 lbs. per square foot was placed on the arch, the deflection was quarter in. This load was allowed to remain on the arch one hour (until 12.30 p.m.) when, the deflection having remained the same, the load was increased to 275 lbs. per square foot, which was the total load required, making a total of 17,250 lbs. for the portion tested.

"Although the Roebling Company offered to increase the load until the arch broke, the strength developed was sufficient to meet the requirements, and the breaking down of the arch was deemed unnecessary. At the request of the parties for whom this test was made, the load was allowed to remain on the arch until this morning." On the following day, Nov. 30th, a further test was made by concentrating 10,170 pounds on the centre of the arch equal to a strain of about 500 pounds to the square foot.

NOTES.

Dr. Laberge, city medical health officer, attended the recent Sanitary Convention at Minneapolis.

An exhibit of the work of the pupils of the Industrial Classes conducted by the Council of Arts and Manufactures of the Province of Quebec, will be sent to the Paris Exhibition.

A deputation, representing the Master Plumbers' Association, have requested the municipal authorities to appoint a practical plumber as one of the sanitary inspectors under the new building by-law.

A stained glass window will shortly be placed in St. Paul's Presbyterian church as a memorial to the late Mr. John Hope. Its dimensions will be 28 feet by 17 feet. The window will be divided by five stone mullions. The design will be in the Gothic style. The work is being carried out by Messrs. Ballantyne & Gardner, of Edinburgh, under the supervision of Mr. Eric Mann, architect, of this city.

Mr. W. E. Doran, a prominent architect of this city, was in the field as a candidate for the mayoralty, in response to the request of a large number of the ratepayers. Mr. Doran is the nominee of the Irish Catholic electors.

A large deputation of citizens recently waited upon Mr. William McNally, of the firm of William McNally & Company, to request him to allow himself to be put in nomination for the mayoralty of Montreal. After due consideration, Mr. McNally declined to become a condidate.

St. George's church, one of the historic ecclesiastical edifices of this city, has recently received two valuable donations, viz., a tower clock and chime of bells similar to those recently placed in the Royal Exchange in London, by Mr. A. F. Gault, and a salo and echo organ by Mr. James Crathern.

An error crept into the item published in this correspondence last month referring to the election of officers of the Montreal Builders' Exchange, wherein it was stated that Mr. J. W. Hughes was elected vice-president and honorary secretary-treasurer. Mr. Hughes is vice-president only, Mr. George J. Sheppard being, as heretofore, the honorary secretary-treasurer.

A correspondent in the Monetary Times refers to the excellent business qualifications of the nuns who manage the affairs of the Mother House of the Providence Nuns on Fullum street, corner St. Catharine street, Montreal. The institution is presided over by Sisters Charles and Maximillien, whose signatures are required to all documents such as notes, cheques, contracts, etc. The building occupied by the nuns consists of two wings each 400 feet in length, with twelve separate three storey pavillions, chapel and power house, the outlying parts of the premises being connected by an electric car service. It is proposed to also erect isolated cottages. M. Hypolite Bergeron has for twenty-five years been connected as architect with the institution.

IMPACT TESTS.

The Report of the American section of the International Association for Testing Materials, presented at the second annual meeting, Aug. 15th and 16th last, contained the following with regard to impact tests: "It is particularly gratifying to note that in America impact machines have been constructed, or are in process of construction, at the laboratories of the U. S. Arsenal at Watertown, Mass., Lehigh University, Purdue University, the Virginia Polytechnic Institute, and McGill University. These machines are intended for scientific research which will have to be devoted primarily to obtaining the requisite fundamental data for placing impact testing on a more definite basis. Studies in tension and bending, and compression tests on steel, iron, cement, and stone are contemplated. One of the most important questions connected with impact testing is: To what extent is the resilience under slow tension a measure of the resilience under shock? To answer this question, comparative tests under many varying conditions, as to material, dimensions and form of specimen, temperature, etc., will have to be made under such conditions that the work preformed in deforming the specimen can be measured within reasonable limits of accuracy. Since this work is the product of force by deformation, any incidental deformation of the apparatus will be at the expense of the energy of the blow. The work of deforming the specimen is necessarily less, in all cases, than the total energy expended by the hammer. There is no great difficulty, however, in getting a closely approximate measure of the work performed upon the apparatus. The necessity of rigidity in the apparatus has been insisted upon in recent discussions, and this matter has doubtless received due consideration in the later machines. The practical difficulties of impact tests in tension are sufficiently evident. In compression, there is the advantage that the entire volume of the metal is more uniformly deformed, whereas in tension the specimen does not deform uniformly as a whole, but has a partly elastic and partly plastic deformation irregularly distributed."

Mr. Robert Barber, Inspector of Factories for Ontario, states that there was a large increase in the number of elevator accidents during 1899. He favors the appointment of a city inspector of elevators, as a means for the prevention of such accidents. Under the present municipal law, the provincial inspectors are not authorized to examine elevators in buildings other than factories.

ONTARIO ASSOCIATION OF ARCHITECTS

PROCEEDINGS OF TWELFTH ANNUAL CONVENTION.

THE annual convention of the Ontario Association of Architects was held on Tuesday and Wednesday, the 16th and 17th inst., at the rooms of the Registrar, Mr. W. A. Langton, in the Canada Life Building, King street west, Toronto.

The following members were present: Messrs. J. E. Belcher (President in the chair), A. Frank Wickson, Grant Helliwell, D. B. Dick, W. A. Langton, J. Wilson Gray, M. B. Aylsworth, John A. Pearson, H. B. Gordon, W. R. Strickland, A. E. Paull, John Gemmell, John Kay, Frank Darling, W. R. Gregg, L. Munro, H. F. Duck, members of the Association, and Messrs. Eden Smith, C. Acton Bond, C. D. Lennox, C. E. Langley, H. Sproatt, E. R. Rolph, J. C. B. Horwood, W. Rae, members of the Eighteen Club.

The proceedings opened at 2.30 p.m. on Tuesday, the President, Mr. J. E. Belcher, M.R.S.C.E., in the chair.

The minutes of the last meeting were read, and on motion by Mr. A. F. Wickson, seconded by Mr. G. Helliwell, were confirmed and signed.

The President then read his annual address, which was received with much approval, as follows:

PRESIDENT'S ADDRESS.

GENTLEMEN,—Permit me at this my first opportunity to thank you most heartily as a member of the profession practising in one of the towns of the province for the honor you have done me in electing me to the Presidency of this Association. Not having the advantage of city practice, we of the country have not the opportunities enjoyed by our more fortunate city confreres, hence the occasional recognition of the outside members of the profession tends greatly to enhance the feeling of esprit de corps existing among the members of the Association as a body. This feeling of kinship with our city brethren will no doubt inspire the members of the profession in the smaller places with a desire to keep abreast of the advance of architectural effort and to withstand the temptation to sink into the commonplace of the country town, where one is more or less cut off from intercourse with fellow members of the profession and from the advantages, culture and inspiration of more immediate contact.

At the close of my year of office I desire to lay before you one or two things pertaining to the work and scope of our Association which have occurred to me, and which have been gathered more particularly from the proceedings of the last year's committee meetings. With reference to the suggestion made at the conference of the Council and Consulting Committee—a report of which, dated April 1st, 1899, will be laid before you—that some means be adopted to improve the condition of the Association, it seems to me that it would be well for us to adopt what I may term a progressive policy; and yet whilst we may feel in matters of art it is our duty to lead the people up to an appreciation of art in architecture, we must nevertheless so conform our policy of progress to the circumstances surrounding us as to make that policy feasible.

1. First all it is necessary to consider the facilities afforded by the Association for the education of the younger members. The suggestion has been made that lectures in design should be given to students. Can such lectures be instituted as part of the Association work in the new rooms?

2. The desirability of having central down-town rooms with a library attached, as mentioned in the report, is beyond doubt. Facilities for reading, meeting and discussion are a necessary supplement to the lectures in design.

3. As to the question of membership for practising architects—not now members of our Association—it is to be hoped that the better times in view, and the advantages offered of down-town rooms, library, etc., will prove sufficient inducement to at least the city architects to become members, and when the government decides to recognize the Association in proper form, the practising architects in the towns will then no doubt appreciate the advantages to be derived from membership also, but apart from these advantages I should think there ought to be the higher desire to bind ourselves together in a guild for mutual improvement and establish that esprit de corps which should be engendered in all who love their art, especially those whose experience, derived from the practice of it, justifies its being called a delightful profession.

4. A course for students with proper preliminary examinations is obviously necessary, and has been referred to in a pointed manner by the late Sir Gilbert Scott, who speaks as follows:

"Architects had admitted pupils who had not only evinced no creative art powers, but who had been by reason of serving their pupilage, allowed to go at large and practice as architects, although they were destroyers of art, and a disgrace to the age. He did not know how this evil had to be met. He saw no way to get over it unless they (the architects) were to bind themselves never to receive a pupil unless he had shown some qualification by passing some sort of examination, by a committee appointed by the R.I.B.A. who would certify if he has the right stuff in him—five out of six of the pupils sent to architects were worthless as regarded their aptitude for the profession, and yet on completing their articles, they had as good and sometimes better opportunities of getting on than the best of their contemporaries; they perhaps had a large circle of friends, and possibly a fair amount of practical knowledge; but these things did not constitute an architect," and finally wound up by saying "that pupils of ability would become better architects and practical men if they were to spend more time actually in the midst of works in course of execution, but above all, all architects should combine to reject all pupils but those who may prove to have some aptitude to the work of the profession."

These few suggestions strike me as comprising some of the elements of our requirements. If they can be carried out we should then be able to take our position with the other recognized professions of the province.

It was found impossible to secure the necessary funds for the Travelling Studentship proposed at our last Convention, although some of the gentlemen appealed to very kindly offered subscriptions of the amount apportioned to them.

I would add that in the matter of public competitions members of this Association should strictly adhere to the resolution formerly adopted, wherein the desirability is set out of their being a properly constituted Board of Architects to whom competitive plans should be referred for selection and award. Although this question is perhaps to some degree an open one, and is doubtless also difficult to educate the public up to such a standard, yet I am persuaded that this standard is in no small degree essential to the well being of the profession.

It strikes me then that some such defined schemes as those above mentioned are more desirable than straining after the doubtful possibilities of the Travelling Studentship, medals, &c., of the established R.I.B.A., since an Association such as ours in its infancy while desiring adequate protection, and fitness for its members, must aim at what is readily within its reach.

The Treasurer's report was then submitted by the Treasurer, Mr. G. Helliwell, as below:

TREASURER'S REPORT.

Financial statement for the year ending Dec. 31st, 1899.

RECEIPTS.

Balance from 1898		$1,082.46
Members' annual fees	$179.00	
Students' registration fees	6.00	
Students' examination fees	11.00	
Sale of examination papers	.25	
Interest on bank account	34.40	
		230.65
		$1,313.11

EXPENDITURE.

W. A. Langton, Registrar, salary for year	$200.00
W. A. Langton, general disbursements	15.76
Printing reports, circulars, etc.	36.85
Convention lunch	22.50
C. H. Mortimer, CANADIAN ARCHITECT AND BUILDER for 1899	22.00
Books added to library	9.75
Engrossing minutes	6.00
W. J. Graham, attendance on Convention	5.00
Total disbursements	317.86
Balance on hand	995.25
	$1,313.11

We have examined the books, vouchers, etc., of the Association, and certify that the above is a correct statement thereof,

HENRY LANGLEY, WM. R. GREGG } Auditors.

All outstanding accounts have been paid. The expenditure ($317.86) is approximately the same as that for 1898. The receipts ($230.65) are $144.75 less than for the preceding year. This falling off in receipts is in the payment of fees in arrears, which in 1898 amounted to $233, while in 1899 they amounted to only $93. The fees amount to $86 for 1899, the same amount as for the preceding year. The number of members who have paid fees for 1899 is 26, of which 10 are in class 1, 4 in class 3, 3 are in class 5, 5 are in class 6, and 4 in class 7. The receipts, expenditures and balances for the last three years are as follows:—

	1897.	1898.	1899.
Receipts	$ 254.65	$ 375.40	$230.65
Expenditure	443.00	314.72	317.86
Balance	1,021.78	1,082.46	995.25

Respectfully submitted,
GRANT HELLIWELL, Treasurer.

On motion by the Treasurer, seconded by Mr. D. B. Dick, the report as submitted was received and adopted.

The report of the Librarian and Registrar was submitted by the Registrar, Mr. W. A. Langton, as follows:

REPORT OF REGISTRAR AND LIBRARIAN.

MEMBERS.—Continuing the system recommended by the convention of 1898, only three members have been printed on the Annual Register who are not in arrears for the annual fee for a longer period than three years. The membership as thus printed for 1899 numbered 31 non-resident members, 28 resident members, 3 travelling members, and 1 honorary member; in all 63 members. One member has since withdrawn.

STUDENTS.—There has been one student registered. The examinations were held in April. The board of examiners was Prof. Galbraith (chairman), Messrs. C. H. C. Wright, S. G. Curry, R. J. Edwards, W. R. Gregg, Grant Helliwell, W. A. Langton, S. H. Townsend and A. F. Wickson. There were two students examined; one for the first examination, who passed well; and one for the second examination, who is required to take a supplemental in one subject.

PROCEEDINGS OF THE COUNCIL.—The principal work of the Council has been the consideration of proposals for reforms in the working of the Association. A circular letter making a list of proposals was sent out to members of the Association with a request for an opinion as to their usefulness and feasibility. Only nine replies were received. An effort was made to obtain from prominent citizens of Toronto the sum of $5,000 for the purpose of endowing a travelling scholarship for architectural students. The effort did not meet with success.

In response to a request from the Royal Institute of British Architects, the Council have undertaken to conduct for Ontario the R.I.B.A. special examination, open to practising architects not less than 25 years of age, or to chief assistants over 30, and qualifying for associateship of the R.I.B.A.

The Council have endeavored to procure the use of the Association Conditions of Competition for the new Toronto market, and also wrote to the syndicate of the proposed new hotel in Toronto setting forth reasons why it would be desirable to have a local architect in preference to an American.

THE LIBRARY.—There have been 48 lendings among 19 borrowers. There has been added to the library "Modern Plumbing and Steam and Hot Water Heating," by J. J. Lawler.

On motion by the Registrar, seconded by Mr. F. Darling; the report was received and adopted.

Mr. Pearson inquired if any action had been taken in regard to communicating with the Quebec association, as the Council had been requested to do with a view to securing for members of the Ontario Association in good standing the privileges of the Quebec Association.

Mr. Wickson explained that it had not been thought necessary to take any action, because on looking into the matter it was seen by the constitution of the Quebec Association it was provided that members of other associations of equal standing might be admitted to the desired privileges.

Mr. Aylsworth inquired if the report just read was the only report the Association received from the Council? He thought when the Council met for the transaction of business several times during the year, there ought to be a fuller report to the Association of what had taken place at the meetings.

The President replied that the report just adopted embodied the reports of everything that had come up for consideration by the Council.

Mr. A. F. Wickson said that while no doubt that was correct, yet a great deal of work had been done by the Council in regard to the travelling scholarship alone, of which the report said nothing. For instance, a number of persons were personally visited in regard to raising the necessary funds for the proposed scholarship.

Mr. Aylsworth said that was exactly the kind of information he desired to elicit; he thought full information of that kind should be afforded.

The Registrar, Mr. Langton, said that the details were recorded in the minutes of the Council; the report was a skeleton stating the results that had been accomplished.

Mr. W. R. Gregg asked if the report of the Consulting Committee was not really a report from the Council as well.

The Registrar stated that it was not, but was the independent report of the committee.

Mr. Aylsworth said he gladly accepted the explanation given by the Registrar, but the fact still remained that a great deal of work was done by the Council during the year of which the Association had no information. He thought with a fuller knowledge of the doings of the Council the members would be in a better position to discuss many of the subjects that came up at the convention, and there would be less confusion and misapprehension, He would therefore suggest that in future fuller reports be furnished by the Council, stating not only what had been accomplished, but also that which had been attempted.

Mr. Darling thought what Mr. Aylsworth asked was reasonable, and that it might be well to give the members a history, more or less elaborate, of what the Council had attempted; the causes of failure in one direction or success in another; the attitude of persons with whom they were thrown in contact, etc. Such a report, he thought, would arouse considerable interest. Take, for instance, this question of the travelling scholarship, it would have been of interest to know the position taken by the persons approached, and the exact reasons why the scheme had been found impracticable.

The Registrar pointed out that to make a record of all that had been attempted but resulted only in smoke would not make very scientific minutes; but he could make a report that would be a happy medium. This report should not be spoken of as the report of the Council. The proceedings of the Council were reported in it but the manner of doing so was his own.

Mr. Gemmell said it was not possible to keep the record in any other way than that followed. If members desired further information it could be given on being asked for.

The President agreed with the view taken by the last speaker, and suggested that "business arising out of the minutes," afforded the opportunity of asking for the information that was desired.

Mr. Wickson thought it would be a good suggestion for the new Council to report a little more fully as to what had been done and what attempted. The report just read showed that the project for the travelling scholarship had been abandoned because found not feasible. He thought it would have been interesting to know how many people in the city were willing to contribute and how many were not.

Mr. Darling pointed out that the desired information could be obtained by moving to have the correspondence relative to the matter in question read.

Mr. Aylsworth said after the discussion that had taken place, he was content to leave it as a suggestion for the future guidance of the Council.

The next business taken up was the report of the Consulting Committee, appointed to consider and report on resolutions moved by Mr. F. S. Baker, in the convention of 1899, which report was as follows:

REPORT OF THE CONSULTING COMMITTEE.

This Committee was appointed primarily to consider and report on the following resolutions made by Mr. F. S. Baker, in the Convention of 1899:—

1. To find, and if possible obtain an option upon, premises which would make a suitable headquarters for the Association.

2. To consider the advisability of increasing the membership fee, and of using a portion of the increased income to form a benevolent fund, to be used for the relief of any worthy member who may be in distressed circumstances.

3. To approach the government with a view to their appropriating funds to provide a medal, to be known as the "Ontario Gold Medal," to be presented annually to the member of the Association, or other architect, whose work in ordinary practice in Ontario is considered of the highest merit.

4. To consider the advisability of providing a suitable medal out of the funds of the Association annually, and of raising a sum of money by popular subscription, or otherwise, to found a scholarship, or travelling studentship, and that this medal and scholarship be presented each year to the student who ranks highest in the final examination for qualification for membership, or for other qualifications.

The Committee was instructed also to consider other matters; to confer with the Council from to time; and to present a definite report to the Convention of 1900.

The Committee beg to report as follows:—

1. They have procured an option upon rooms suitable for the uses of the Association. The rooms are situated at 94-96 King

street, Toronto, between York and Bay streets. It is proposed to arrange them as in the accompanying plan, so as to share the premises and cost with the Engineers. The rooms will occupy the second floor, but will have a separate entrance from the street, and every member should have a key to the door. The rent for each of the societies associated as tenants will be $150 a year. The alterations necessary to arrange the floor as planned will be made by the landlord. Heating and caretaking will be provided, but not light.

2. The institution of an Association medal for presentation to architects is recommended, with the suggestion that the medal be provided by the Association, as the government is unwilling to assume the position; that the presentation be not necessarily annual, but occasional; and that the decision as to its presentation be by ballot of members of the Association in good standing.

3. The Committee suggest that members of the Association should agree to make it an essential requirement from their students to go up for the examinations, and this requirement might be made a condition in the student's articles.

4. The Committee suggests that young architects in practice, who have not opportunity for much study, should be allowed to pass the final examination by coming up for one or more subjects at a time, as they are able to learn them.

5. The Committee suggests that students of the Association, who propose to travel in Europe, should be supplied with a certificate, which will enable them to obtain the advantages which are offered by the European governments to art students who bear credentials of this kind.

6. The Committee suggests that the proceedings of the Convention, as reported by the CANADIAN ARCHITECT, he printed separately in a convenient form.

7. The Committee suggests that instruction by architects to students upon the work in which the students are to be examined should form part of the work of the Association.

8. The Committee agrees in theory with a proposal that has been made to hold the Convention in different cities outside of Toronto, as well as in Toronto, but doubt whether it would be practicable to do so at present.

9. The Committee thinks that the building and fire by-laws, drawn up with so much care by a committee of the Association, should not be forgotten; that occasion should be found to press them again upon the attention of the Toronto City Council, and to bring them to the notice of other municipalities.

10. The Committee agrees with a proposal that has been made that a certificate of membership should be issued, suitable for display in the offices of members, and that members should be requested to adopt the words "Member of the Ontario Association of Architects" as their distinguishing title.

11. The Committee agrees with a proposal that has been made to make the office of Registrar and Librarian honorary.

Mr. Gray moved, seconded by Mr. Darling, that the report be taken up and read and dealt with clause by clause.

The Convention proceeded to discuss clause 1, relating to the proposed rooms.

Mr. Helliwell inquired what was to be done with the library, whether it would be placed in one of the rooms, and, if so, under whose charge it would be.

The Registrar stated that it was proposed to place the library in the room of the Association, and that it was thought it might be in the charge of a student.

Mr. Dick said if the library was to be accessible to members at all times, each member having a key, what was to prevent them helping themselves?

Mr. Pearson pointed out that it would be necessary to have the books under lock and key, and students who desired to get books would have to attend at stated hours.

Mr. Aylsworth said in that case the library would not be freely accessible.

Mr. Darling thought if the library was not in charge of some one who would be responsible it would be found to diminish rather than increase; not because anyone would actually steal the books, but through the carelessness that would be inevitable, and through books being taken away and no record kept of the persons in whose possession they were. He thought the whole question was one of finance. He did not think members would care to be restricted to looking at the books through the doors of a glass case, and members would not want to go to somebody's office about it; it was essential that there should be someone there permanently, and if that could be managed it was excellent. But he did not see where the money was to come from for that.

Mr. Wickson said that unless the arrangement was such that members could avail themselves of the library in their spare moments at luncheon hour or at other times he did not think they would use the library; he did not think they would go at certain appointed hours,

Mr. Gordon suggested, as a possible solution, that by a slight change of plan a portion of the space devoted to cloak rooms might be utilized as an office, which might be occupied by a typewriter, who, in consideration of free office room and the possibility of picking up architects' work in the way of copying specifications, etc., would assume the charge of the library and render whatever service was necessary. He felt sure plenty could be found who would undertake it.

Mr. W. R. Gregg thought a division of the library might be made, that portion of the books intended for circulation being placed in charge of someone having an office who would be willing to undertake the responsibility; and the reference books being kept in the room lying on a table accessible to all members who had keys.

Mr. Pearson, having ascertained that there were only 19 borrowers of books last year, said he could not understand why there was so much objection raised. He thought the circulating part of the library might very well be entrusted to some responsible student who would attend at stated hours to give out books. Then, as to the other books, he did not apprehend any danger of their being taken away and not returned.

Mr. Dick was not in favor of having part of the books at one place and part at another. He thought some such plan as outlined by Mr. Pearson and others might be desirable. Let the books be freely accessible in the rooms, with the understanding that no book was to be removed save at stated times, when someone appointed for that purpose would be in attendance.

Mr. Strickland inquired whether the architects and engineers, by maintaining a joint library, might not be in a position to employ someone permanently to take charge of it.

The Registrar replied that the engineers, like the architects, would probably find it enough to undertake the expense of the rooms without undertaking any additional expense.

Mr. Wickson proposed that, so far as city members were concerned, the library should be treated as for reference purposes only, while outside members could still obtain the loan of books on application to the Registrar or a student appointed for that purpose.

Mr. Gordon then moved, referring to the report as a whole, "That the proposed scheme be adopted, subject to the co-operation of the Engineers' Association, and also subject to any change of plan or method of administration that is found feasible." He thought the convention ought to approve of the general plan, leaving the details to be worked out.

Mr. Darling, who seconded the resolution, asked if there was any question of their financial ability to carry the plan out.

Mr. Dick thought it was desirable, before further considering the details or putting Mr. Gordon's resolution, to elicit from those present some expression of opinion on the broad question of the desirability of having rooms at all. Were the advantages to be derived from having rooms sufficient to warrant the expenditure which the plan would involve?

Mr. Gordon said that was covered by his motion, which simply called for an expression of opinion as to the principle of having rooms.

Mr. Kay, of Paris, Ont., asked if the sum of $150 mentioned included all the expenditure necessary.

Mr. Darling replied that it covered everything except light.

Mr. Wickson pointed out that there would be an expenditure for furnishing.

Mr. W. R. Gregg, in order to bring the matter more distinctly to the point, moved "That we rent these rooms for one year." He did this because he understood the engineers were meeting this evening.

Mr. Darling said the owner of the building would hardly go to the expense of fitting up the rooms as proposed with the object of renting them for only one year. He felt that the whole subject was one of very great importance, and that if anyone had objections to urge they should be heard.

The undertaking proposed involved a distinct change

in the whole working of the Association and if there was any opposition it should be heard.

Mr. W. R. Gregg said he was quite in favor of carrying the scheme through if at all practicable. The only question was as to the advisability of committing themselves to a three years lease at $150 per year. In addition to that there would be the cost of furnishing and light. The furnishing would require $100, so that the first year the expense would be $250 plus cost of lighting, and the other two years $150 a year and cost of lighting.

Mr. Dick said that the committee by whom the report was drawn up had no doubt had in view the possibility of deriving a rental from the large hall by occasionally renting it for meetings to other societies of a similar character, which would reduce the expenditure.

Mr. Gordon said, as bearing on the question of the expenditure, that by a reference to the 11th clause of the report members would see that it was proposed to make the office of Registrar honorary. This would put the Association in funds to a certain extent, which would be applicable to the project under discussion.

Mr. Aylsworth thought before the adoption of the resolution there ought to be the very fullest discussion. Would any benefit be derived from taking the rooms? Would the architects avail themselves of the use of them? Certainly they would be useful for monthly meetings of the Association, and, then, there must be a home for the library. It seemed to him that they were embarking upon a very radical change of policy. In the first place they were undertaking a liability of, at least, $150 per year for these rooms, which might or might not be useful. It seemed to him that a more practical plan would be to continue somewhat as at present, with a Registrar and librarian, and a room such as the one they were in, and used in the same way; to pay the Registrar and librarian for his services and the use of the room. He did not know of any room better for the purpose than the present one.

The Registrar, Mr. Langton, said it was of the greatest importance for the Association to have some kind of rooms which the members could call their own, a place in which they could accumulate things and have some sort of a home, and a rendezvous to bring them together. The rooms proposed were very convenient, consisting of the large meeting room and the smaller room for the library. There were many other things to be done. There had been many criticisms of the Association. It had been complained that they had not instituted classes for instruction within the Association, sketch clubs and similar sub-organizations. The proposed rooms would render possible the branching out into these matters, which was imperative if they were to become a live voluntary Association. He thought the large meeting room might be rented, as had been stated by Mr. Dick, enough times in the year to materially reduce the expenditure for rent.

Mr. Darling did not think it made much difference with regard to the principle; the main question was whether they would take these rooms. They would have to be in a position to tell the engineers what they were going to do. It was probable they would have to lease the rooms in question for five years.

Mr. W. R. Gregg said that, not having yet decided to make the position of Registrar honorary, in the meantime the only thing they had to go on was their surplus. Were they warranted in renting these rooms for five years? Mr. Gordon's motion was merely postponing the discussion. For the purpose of bringing the matter to a focus, he would move, subject to the action of the engineers, that the rooms be taken for three years, the minor arrangements to be made by the Committee.

Mr. Gordon said that was exactly what his motion was. As a point of order, he would say it was quite impossible to have an amendment to a motion which was merely a repetition of the motion.

Mr. Gray proposed that Mr. Eden Smith should be heard in regard to the matter.

The Registrar said that Mr. Smith was present, not only as a member of the Association, but as a representative of the 18 Club. He thought Mr. Smith might now be heard, not only as to the matter immediately under discussion, but also as to the views of the 18 Club in general.

Mr. Eden Smith, representing the 18 Club, said he had not contemplated coming before the Association. Mr. Wickson had asked them to meet a committee of the Association to discuss a few matters which came out, he thought, in the CANADIAN ARCHITECT. That was just before Christmas, and, owing to the holidays, they had had no meeting, but had talked the matter over casually, and had considered a scheme for Mr. Wickson to put before the Committee, but not for submission to the Convention, because it had been very roughly drawn up, and not in proper form to lay before the Association. As to the rooms, he thought the Association ought to get rooms, but at as low a rent as possible. He thought the rent of the rooms proposed was a little high.

Mr. Darling reminded Mr. Smith that they were all met together as architects interested in the advancement of their profession. There was no need for an elaborate formal report; what was wanted was a good frank talk together, and among them they should be able to evolve something which should mark a new era in the history of the Association. In the old days, it seemed to him, the students seemed to have more go about them than now. They had a room in which they had classes and sketch clubs, and they made things hum. He had no doubt that many who had been successful could trace no small degree of that success to these agencies. He did not think they would ever have a better opportunity than the present to discuss these matters, and he felt sure that something of value would result from a full and free talk on what was best for architecture.

Mr. Acton Bond, also of the 18 Club, said that, falling in with Mr. Darling's suggestion, he would ask Mr. Smith to read the rough draft that had been prepared.

Mr. Smith then read the report of the Committee of the 18 Club, as follows:—

REPORT BY COMMITTEE OF THE TORONTO ARCHITECTS' EIGHTEEN CLUB.

Before making any suggestions, causes of the Association's failure to accomplish any good results must be first mentioned. It seems to this committee that the Association started with entirely wrong principles. It apparently started for the purpose of doing good to architects rather than to Architecture. If instead of using every effort to make the profession a close corporation, the same energy had been applied towards making the profession better, more results would have been obtained, and in the end architects would have felt the benefit themselves. It is true that a more or less elaborate system of examinations was instituted, but these examinations without any means being given to the student of obtaining the necessary education to pass them have proved somewhat of a farce, and necessarily so. The charter as it at present stands is really more of a hindrance to the Association than a help, and if it cannot be amended in some form, should be thrown aside as a useless clog on the efforts of the more intelligent architects of the province to do something for architecture. A great deal of energy has been expended by the members preparing papers and talks to deliver before the Association at various times. Much of this energy was puerile and wasteful. If the Association only employed those to give lectures who are fully competent to do so, even if this meant only one lecture per year—this one thing would place the Association on a better footing, and instead of the annual meetings of the Association being devoted almost entirely to papers, it would seem more logical and sensible to have not more than one really good paper, and devote the rest of the time to discussing the work of the Association, and going thoroughly into all possible means of doing something for Architecture. The Arts and Crafts Exhibition, which the Ontario Society of Artists is now getting up is one glaring instance of where the Association has failed. There can be no question but what such an exhibition should have been started and gotten up by the architects and of course by the Association. In other cities where these exhibitions have been started the architects have almost always been the prime movers, and naturally so. It has remained for the Ontario Association of Architects to remain quiet and let the artists do this work for them.

It seems to this Committee that such work as this might easily be thrashed out at the annual conventions, rather than, as before stated, listening to amateurs and useless papers. Also, if the Association were in touch with what is going on in the architectural world long before this it would have made some steps to obtain for Toronto the circulating exhibition of the American Architectural League rather than leave it solely to the committee of a small club of young architects. These are simply suggestions as to what might be done to benefit Architecture in the way

of bringing it intelligently before the public and showing them to some extent what Architecture means.

A point the Committee would make against the Association is that nothing has been done since the organization of the Association some ten years ago to improve the attitude of the architect and the public to each other. Surely with such an Association and in that number of years a better feeling should prevail. In the case of competitions alone the efforts of the Association have been to a great extent useless and undignified. After the Association in a number of cases protesting against the conditions of competitions, it has been found that even members of the Council have entered such competitions. Practice such as this tends to lessen the respect of the public for the architect, and from that point of view alone it would be better that the Association did not exist. It would seem to the Committee far preferable that the Association, for some years to come, should be much more exclusive in its membership, rather than to have such loose ways of carrying on its business.

The suggestions which will follow are based upon the supposition that for some years the Association be composed to a large extent of the reputable architects of Toronto and the other large cities and towns of Ontario. It is hardly likely that the rank and file of Ontario would immediately step into any well regulated organization as far as architectural education and practices are concerned, but it is this Committee's feeling that if the smaller organization, as suggested, would work for some years and create a standard, the other men would gradually fall into line, and after a few more years the legislation which is now being asked for would come as a matter of course if it were really needed. As it is now, it seems to this Committee the height of presumption to ask for legislation restricting the use of the word "architect," when the whole Association has been conducted upon such an unbusinesslike basis.

The Committee would suggest that the energy of the Association be devoted for the present almost entirely to education, as it feels that only by starting at the fundamental basis can any permanent improvement or success be gained. They would also suggest that in lieu of asking for any close legislation at present, the few really earnest and sincere members, who may stay in this smaller association proposed, will agree to only take pupils in their respective offices who will bind themselves to take the course of education laid down by the Association, and go through its examinations to enable them ultimately to become members. If this is done for some years and more members are added to the Association as before suggested, the Association would then with some degree of confidence, ask the government for close legislation if they wish to. There would then be at least a nucleus of well educated men to leaven the whole when the rank and file of the profession would have to be taken into the Association.

In regard to the educational methods of the Association the committee feels that theoretical education along with consequent examinations is not adequate to an architectural training. It thinks that some system of atelier work, in addition to office work, should be incorporated in the scheme. There are several reasons why some such work should be insisted on with office work. One of the strongest is that all pupils do not get in equally good offices, and the less fortunate ones would not have the same chance of personal instruction and design as those in better offices. Then again in a busy office a student cannot and does not get the close personal criticism which he might do under the atelier system. The committee can see difficulties in the way of carrying this out, for some students would live outside the city, but as lawyers and doctors are obliged to come to the city and spend the greater part of the year for some years, we see no reason why embryo architects should not spend a month or so each year in the city. However, this would not be a very serious consideration at the outset, as it is fully expected the sphere of influence for sometime would not extend much further than the city. The proposition is that the student should spend say a couple of months every year, possibly in December and January, at some large room either rented or loaned to the Association, possibly for the present a room in the School of Science building, and there work in a similar manner to the student at the Ecole Des Beaux Arts in Paris—under patrons, these patrons to be here, as in Paris, five or six of the best known and most respected architects of the city, who would probably only have to spend about an hour a week each to do their share of the work. The Committee has looked into this matter very closely, and feel it is practicable and could be carried out. The great advantage of this system must be obvious to any one, for in addition to this, of course, there should be a course of lectures and examinations to test the student's theoretical knowledge. Then in the atelier the student has a chance to apply this theoretical knowledge in connection with design under the direct criticism of men who have actually practiced and have been successful, not under mere professors. The promotion and progress of the students could be arranged somewhat similarly to the Paris school, details of which need not be gone into here. Much valuable information could be obtained on this point from Mr. Ernest Flagg, of New York, Mr. Thos. Hastings and several others, who the Committee feel quite sure would be only too willing to assist in this manner. The two architects mentioned above have started ateliers of their own in New York and to the knowledge of the Committee the influence they have had, with young men entering them, has been really remarkable. The committee make a very strong point of this work, as it feels that ordinary architectural methods have such a very great weakness in this respect. The cry has always been that design cannot be taught and nothing can be done in that direction. The committee differs from this in at least the fact that it considers something can be done, and a great deal, if only done in a practical way. The Committee thinks it would be no great hardship to any young man who wished to become a properly educated architect, to spend two or three months in the city every year for possibly three years, and that if the standard were only created in the city, the ambitious students would be brought in in a very few years.

There has been some talk of the Association starting a travelling scholarship, giving medals, etc., but surely this would only be adding to the farcial side of the Association to do so before providing any means of education. The Committee would suggest that everything of this kind should be left for three or four years after some logical scheme of education has been started.

Although this report is somewhat general in its remarks, the Committee has only written it after carefully discussing every detail, and feels sure that if a committee looks into the matter, they will find these suggestions practical and to the point.

Mr. Darling said he thought they ought all to feel thankful to Mr. Smith for getting up and reading the paper they had just heard. It was full of valuable suggestions, and if they would all work together on the general lines indicated it might result in a great deal of good. Of course he was only speaking as an individual, not as a member of the Association at all. He thought the suggestions as to classes was extremely valuable. He suggested that there did seem to be a certain amount of jealousy at times among architects; he could not see why it should be so. For his part he was quite prepared to go back and start the whole thing de novo, because all he was interested in was the advancement of Architecture, and willing to adopt any procedure that promised to bring about this result. He strongly urged the abandoning of anything that divided architects, and that all should work together cordially and heartily for the advancement of good architecture. (Applause). He would once more remind them that they would not again have so good an opportunity as was now presented for discussing these very important matters.

Mr. Smith disclaimed any feeling of jealousy so far as the members of the Eighteen Club was concerned. He would like to say that that Club consisted of a few of the younger members of the profession in the city who met down town during the luncheon hour and who thought it would be a good idea also to meet one evening in the week to discuss Architecture. Their indifference to the Association, he thought, arose from their belief that the Association had identified itself more with the effort to close the profession than with any other subject. They did not think it advisable to close the profession until the public had attained some idea of what a good architect should be.

Mr. Gordon said that in this matter, as in everything else, destructive criticism resulted only in friction, whereas constructive criticism, such as that contained in the latter part of the paper read by Mr. Smith, was always fruitful in bringing men together. He therefore thought it would be well to put aside the question of whether we belonged to this or that organization, and seek for unity upon the lines of constructive criticism, such as formed so valuable a part of the paper read. He thought all would agree that much of the action suggested would be very valuable if it could be put in operation. To do that, it seemed to him, it would be necessary to have a head-quarters of some kind for the architects of the city and province, and he felt assured, from what had been said, that if they had the rooms which were in contemplation the members of the Eighteen Club would be very glad to associate themselves with the Ontario Association, as individual architects, in seeking to advance that which was so dear to them, namely, the higher education of architects and architectural students. He felt that all were agreed on the advisability of the general plan; the only question was as to the feasibility of carrying out certain parts of the scheme. He was very glad to have the report of the committee of the Eighteen Club read, although, speaking personally, he thought it would have been in better taste had some of the earlier portion of it been somewhat modified. But, putting all that aside, he was very pleased to have heard the report, and to think the gentlemen of that Club were present, and he hoped some good would result from it.

Mr. D. B. Dick thought the subject under consideration was one requiring the very fullest discussion, and

he thought the report just read by Mr. Smith was calculated to help them along in the line they were travelling on. He thought Mr. Smith had, perhaps, put his finger on what had been the weak spot of the Association from its inception, the lack of educational facilities. The Association had been quite alive to the need of such facilities, but had found it very difficult to formulate a practical working scheme to attain the desired results. At the time of the organization ten years ago architectural education was not in as advanced a state as it was now. If the gentlemen represented by Mr. Smith would work with the Association he did not see why they should not, as Mr. Darling had said, start de novo, in the attempt to arrive at some satisfactory method of providing the students with the means of educating themselves. The attempt had been made to get the Government to provide the required facilities, but the only way that could be done was through the School of Practical Science, and, it appeared, that had not been altogether successful. He supposed the element of expense was in some measure responsible, as it necessitated the residence in the city of the student, while he could practically earn nothing during his studies. That, however, applied equally to the legal or medical professions. The suggestion had been made that there should be some examining body to examine those offering themselves as students, with a view to ascertaining whether they contained the stuff necessary to the making of an architect. That would be an easy thing to do, and some action along those lines was evidently very desirable. He thought, as he had already said, that if the gentlemen of whom Mr. Smith was the representative, would throw in their lot with the Association, and work heartily and cordially, there was no reason why an entirely new scheme should not be put in operation for the education of the student, and after all had been said and done, that had been the aim of the Association from the beginning. They had done a great deal of hard work and received very scant credit. Whenever they approached the Legislature to ask for anything they had been treated as if they were seeking their own advantage as individuals, whereas they had really taken a great deal of trouble and put themselves to a great deal of expense, with the object of affording education to young students. They frankly admitted that their efforts had not been successful, and they were quite ready to welcome any suggestions calculated to help in bringing about a better state of things in the future. He would simply urge the 18 Club, or any organization interested in Architecture, to come in with the Ontario Association, and have a fresh start and see what could be done.

Mr. Charles Lennox, with reference to the report of the Committee of the 18 Club, said he did not think it could be as well discussed at the present meeting as between the committees representing the Association and the 18 Club; after which the Association could act upon the suggestions of the combined committees. He thought more would be brought out in that way, because it would take a very considerable time to discuss and bring out everything the report was intended to cover.

Mr. Darling said Mr. Smith had referred to the desirability of ascertaining the kind of stuff prospective students were made of. He thought if reputable architects would insist that every student who came into their offices should pass the examination set for them by such examining body as the Association might appoint it would bring about the desired result as well as anything he knew of. That could be very easily carried out. Every student at the end of one year should pass the examination, and if he did not pass should not be allowed to pursue his studies further.

Mr. Gray suggested the appointment of a committee to meet a committee of the 18 Club for the purpose of discussing the matters under consideration.

The Registrar pointed out that that could be done after the matter before them had been discussed.

Mr. Aylsworth thought Mr. Gordon's resolution had been sufficiently discussed. The discussion had evoked a pretty general expression of feeling. He would suggest that they now vote to take the rooms, and thresh out the details afterwards.

Mr. A. H. Gregg said he thought there was another question which it was very important to consider before voting on the motion or the question of the proposed modus operandi, and that was the question of membership, and the conditions of membership. While everyone was agreed, he thought, that certain improvements were possible and desirable, there could be no better auspices under which to promote those improvements than those afforded by the Ontario Association of Architects. He did not think any better name could be desired, and the Association has done good work in the past; whatever mistakes had been made, they had rendered good and faithful service. The Association now proposed to continue with certain changes in its policy. At present the membership was a limited one. He believed the Act prevented them from taking new members except on compliance with certain conditions as to examination. He thought the Association had to take things as they found them. There were at the present time a number of very desirable men, men who would make valuable members of the Association, who were debarred from membership, except by passing the examination. These men were not in a position to pass the examinations any more than the original members of the Association had been at the inception of matters. It was too much to ask men who were busy architects to pass the examination, and he thought something should be done to broaden the lines so as to admit these gentlemen, who would in any case be admitted if the Act were amended so as to be made closer.

Mr. Charles Lennox thought that difficulty might be obviated by examining such architects by allowing them to bring to the examiners such work as they had done, and let the Association pass them on that.

Mr. Darling said he thought there would be no difficulty in getting the Act amended, if it were necessary.

The Registrar stated that, as a matter of fact, it was the Council that fixed the examination, and therefore it was quite within their power to take such action as was suggested, and, with reasonable restrictions, he thought it was an excellent idea. Something had been said about the Association working for the architect, not for Architecture. That was a mistaken idea. He had himself formulated the phrase years ago that they were working for Architecture, not the architect, and that was true in every action they had taken. When they were approaching the Legislature they had always been able to take that position, that everything they were doing was for Architecture, and the Council had taken the view that the examinations ought to be made searching, in order to make them fulfil the conditions of the Act, which aimed at the advancement of Architecture. The proposition now amounted to this, that the Council should merely exercise its best judgment.

Mr. Darling said he was sure if they once got to the kernel of the matter, to do something for the advancement and benefit of the profession at large, the details and technicalities could be easily arranged. The main object was to get together in such a way as would create enthusiasm, and result in something being done for the young men coming into the profession.

Mr. W. R. Gregg said he sympathized very much with what had been said in regard to the examinations. A few years ago the young men thought the Association was going to be a close corporation, and that the only way to become an architect was to pass its examinations. The examinations were well conducted, and these men studied hard and passed them, but some of them left the city, perhaps, before the final examinations, and went elsewhere for the purpose of acquiring experience, and they got that experience, equal to any they could have had in Toronto. Some of them had come back, and were the equals of those who had stayed here and passed the final examinations and come into the Association. These gentlemen who had been away were now returned and practising, and it could not be expected that they would sit down and study text books for the purpose of now passing the examinations.

He thought the Association ought to include every good architect in Ontario. He did not know exactly how it was to be done, but he would propose that all these men be brought into the Association by January 1st, 1901, or perhaps it could be done even sooner.

Mr. Acton Bond said that, as far as the 18 Club was concerned, there were only three members in the organization at present who were not fully qualified. The point they most insisted upon was the provision for educational facilities in working out the scheme.

Mr. Aylsworth said he supposed that the 18 Club would be quite willing to go into the rooms with the Association, and make use of them in some way.

Mr. C. Lennox thought the rent of the proposed rooms was rather high. He knew of other clubs which had similar rooms on Adelaide street—one of them had four rooms—and they only paid $120.

Mr. Darling said he did not think the rooms could possibly be as good.

Mr. Dick begged to move, as an amendment to Mr. Gordon's motion, "That this meeting approves of the proposal to have rooms for the Association, and that the question of adopting this scheme, or any other scheme, be left to a committee to be hereafter appointed."

Mr. Aylsworth seconded the amendment, which was then carried.

Mr. Pearson, seconded by Mr. Aylsworth, moved that the same committee, consisting of Messrs. Pearson, Gordon, Burke, Langton, Siddall and Smith be appointed. (Carried.)

Mr. Gray then moved, seconded by Mr. Langton, that the Association appoint a committee to meet and confer with a committee of the 18 Club. (Carried.)

On motion of Mr. Darling, seconded by Mr. Gray, the following committee was appointed, Messrs. Wickson, Dick, Langton, Gray, Darling and A. H. Gregg. (Carried.)

The Registrar then read Clause 2 of the report, which, on motion by the Registrar, seconded by Mr. Aylsworth, was laid on the table.

The Registrar then read clause 3: "The committee suggest that members of the Association should make it an essential requirement from their students to go up for the examinations, and this condition might be made a condition in the student's articles" He thought while the terms of this might be qualified by subsequent action as to the course of education it was an important matter; it certainly should be insisted that every student take the course of education whatever it was. He would move the adoption of this clause.

Mr. Aylsworth, in seconding the motion, said this was a very important clause. He thought it rested entirely with the members themselves whether the Association attained a higher standing in the public esteem or not, and that this was one of the most essential features in attaining that end.

The motion was then carried.

The Registrar then read clauses 4 and 5 of the report, and moved that they be referred to the committee appointed to confer with the Eighteen Club. The motion was seconded by Mr. Helliwell and carried.

The Registrar then read clause 6 of the report, "That the proceedings of the Convention, as reported by the CANADIAN ARCHITECT, be printed separately in convenient form."

On motion by the Registrar, seconded by Mr. Dick, the clause was adopted.

The Registrar then read clause 7, "That instruction by architects to students upon the work in which the students are to be examined should form part of the work of the Association." He moved the adoption of the clause.

Mr. Dick having seconded the motion the clause was adopted.

The Registrar moved, seconded by Mr. Aylsworth, that clause 9 of the report be referred as an instruction to the new Council. Carried.

The Registrar then read clause 10, "The committee agree with a proposal that a certificate of membership should be issued, suitable for display in the offices of the members, and that members should be requested to adopt the words, 'Member of the Ontario Association of Architects,' as their distinguishing title."

Mr. Kay was in favor of adopting the clause. Every other Association had a certificate or diploma of some kind, and he thought the members of the Architects' Association should also have one. He moved the adoption of the clause.

Mr. Gemmell thought as a matter of policy that it was very advisable to issue the certificate. He felt sure members residing outside of Toronto would appreciate it.

The Registrar said that as far as he could gather there was a general feeling in favor of something of the kind. He had received letters from travelling members asking for some certificate that they belong to the Association.

Mr. Kay's motion for the adoption of the clause having been seconded by Mr. Gemmell was then carried.

Clause 11 of the report was then taken up. "The committee agree with a proposal that has been made to make the office of Registrar and Librarian honorary."

Mr. Helliwell thought that in view of the contemplated action in regard to having rooms, and the expense incident thereto, it might be well to adopt this clause. If in the future the Association found itself less straitened financially a resolution could be passed to make the office a salaried one again.

Mr. Darling said that was all very well, but what was the Association going to do without a registrar and librarian. He thought if the salary were withdrawn it would be a case of the office seeking the man instead of the man seeking it. He would like to hear of a volunteer who was willing to take the office without remuneration.

Mr. Strickland did not think it expedient that the services of the librarian and registrar should be without payment. Work done for nothing was never so efficient as that for which a consideration was paid.

Mr. W. R. Gregg shared Mr. Darling's feelings of wonder as to who would undertake the duties in question without pay. The Association had always had a great deal of work, and this coming year, if the proposed changes were carried out, there would be more than ever. He thought it would have been more to the point if the Committee had accompanied their recommendation with the names of half a dozen gentlemen who were prepared to undertake the duties without payment.

Mr. Gray failed to see how the expense of carrying out the proposed scheme was going to be met if they could not get a registrar who would do the work without pay. He thought someone might be found willing to undertake it without remuneration.

Mr. Gemmell pointed out that in the past there had been a great deal of work in connection with the attempts to secure legislation. There would not be this work now, and he suggested that while not withdrawing the salary altogether it might be possible to find someone who would be willing to accept a smaller sum than was now paid.

The President said that in view of the importance of the subject under discussion, he thought it well that it should be left over until there was a larger number of members present.

Mr. Kay thereupon moved that the Convention do now adjourn, to meet again at 10:30 to-morrow morning.

Mr. Strickland having seconded the motion, the meeting adjourned accordingly.

THE DINNER.

The dinner on the evening of the 16th inst. was well attended, and proved to be a most enjoyable function. The proceedings opened with a loyal toast to Her Majesty the Queen and the singing of the National Anthem.

Responding to the toast to the School of Practical Science, Professor Galbraith expressed his regret at the failure of the effort to obtain the desired amendment to the Ontario Architects' Act. He was at a loss to understand why the scientific schools were full of students of engineering while there were so few students of architecture, and was obliged to leave with the Association the solution of the problem. Mr. C. H. C. Wright, whose name was also coupled with the toast, was pleased with the determination arrived at by the Association to establish a system of education for students, and to fit up rooms for the use of members and students. He wished that he might be able to connect himself with the Association so as to enjoy the privileges which were about to be provided.

Messrs, Kay, of Paris, Ont., Power, of Kingston, and Munro, of Hamilton, were asked to respond to the toast "Our Guests," proposed by Mr. D. B. Dick.

Mr. Munro said there sixteen or seventeen architects in Hamilton, and suggested that the Association should cultivate that field; and also that a summer meeting might profitably be held there, affording the opportunity to sketch the remains of old forts and other objects of interest to be found in that locality.

Mr. H. Gordon, in proposing a toast to the Eighteen Club, took opportunity to say some pleasant things of the younger men and to invite their hearty co-operation with the Association for the advancement of Architecture.

Mr. Hynes, in responding, outlined the aim and work of the Architectural League of America, and urged that an effort should be made to secure the holding in Toronto next year of one of the series of exhibitions under the direction of the League.

Mr. C. H. Mortimer, of the CANADIAN ARCHITECT AND BUILDER, responded for "The Press," and Mr. Gemmell for "The Ladies."

A most enjoyable feature of the evening was the singing in excellent style of several humorous songs by Mr. Lincoln Carlisle. Recitations by Messrs. Pearson and Langton also contributed to the pleasure of the evening.

The proceedings closed with the singing of "Auld Lang Syne."

Mr. Chas. Langley was justly complimented upon his skilful designs for the menu card.

SECOND DAY.

The Convention re-assembled at 10.30 on Wednesday, the 17th inst., but owing to many of the members being engaged in committee with the 18 Club, the proceedings were not resumed until 11.30.

The President then called attention to the fact that clause 11 of the report of the Committee was still open for discussion.

Mr. Dick pointed out that the attendance was, if anything, smaller than yesterday, when this matter was left open because it was not thought well to deal with it without having a larger number present. He thought it had better be still left over until more were present.

Mr. Gordon said it was not proposed now that they should appoint anyone as Registrar; all that could be done was to elicit an expression of opinion, and, if necessary, put it in the form of a resolution, with instructions to the Council to secure, if possible, the services of a suitable person to act as Registrar gratuitously. What was required was some one with sufficient enthusiasm to undertake the duties without pay, and with sufficient executive ability to carry them out in a manner satisfactory to the Council. There were many persons who, while very enthusiastic, were not very painstaking and analytical in their methods, and what was wanted was someone who combined with enthusiasm the necessary executive and literary ability. He would therefore simply move that the suggestion of the Committee that the office of Registrar and Librarian be made honorary in the meantime—that is for the next year—be adopted, and that the Council be instructed to try and secure the services of a suitable person among the members to act in that capacity.

The President thought the question was one of vital importance, and should very carefully considered.

Mr. Aylsworth thought they could not expect anyone to do the work for nothing; there ought to be some remuneration. He thought some one might be found who would undertake the duties for $100 per year, and let the instruction be made to the Council in that way.

The Registrar pointed out that the only action the convention could take was by way of recommendation to the Council as to whether the office should be made an honorary one. The appointment of the Registrar lay with the Council.

Mr. Paull said the present occupant of the position had been with them so many years, and had been so very courteous and efficient in the discharge of his duties, that he could not contemplate any change without a feeling of apprehension. If the proposed changes in policy resulted in an enlarged membership it might make a difference in the financial position of the Association. $100 a year seemed to him a very small sum for the work required, and he feared difficulty would be encountered in getting a suitable person who would do it gratuitously.

Mr. Power found it impossible to reconcile the increased duties which would fall to the Registrar in connection with the enlarged policy of the Association with a reduction in the remuneration of that officer. It did not seem to him that that was equitable. Speaking as an outside member, he had always felt that he could write to the Registrar for any information or anything he wanted with the expectation of receiving a prompt answer, but it would be unreasonable and unfair to expect one who was receiving no payment for his services to leave his own affairs and attend to communications of that kind at once.

Mr. Wickson admitted the force of Mr. Power's remarks, but said they were on the horns of a dilemma. On one hand it was quite conceded that it was necessary to have the rooms and carry out the proposed scheme which involved extra expense, while on the other hand there was this feeling that the Registrar ought not to be asked to perform his duties without pay. But the fact remained that if they were going to incur the expense necessary for the proposed innovations they would find themselves seriously embarrassed if they retained a salaried Registrar. He thought if someone could be got who would undertake the duties for a year free of charge, by that time things might be in such a position as would enable them to revert to paying a salary. Of course, if no one could be found to do it, there remained no option.

The President called attention to the fact that in the earlier stages of the Association, they had managed to get along with an honorary officer in that position. Certainly if the right person could be had it would be a very great consideration to save that money.

Mr. Gordon said the salary had already been reduced to the very lowest possible figure that could with any conscience be offered to a salaried officer, $200. He thought that was indeed very small remuneration for the services performed by the Registrar at present. To offer a man $100 for those services was asking him to assume the position of a paid officer without the remuneration that a paid officer gets. But if you asked someone to undertake it for the good of the cause, for a year or two years, gratuitously, then that person is in an honorary position, and his services are regarded by his fellow members in their true light, and he receives their commendation and whatever honor attaches to the position. But to offer a man a paltry hundred dollars, and expect him to regard that as a quid pro quo for his services was little short of insulting. Therefore he was not in favor of any compromise. It was either a question of recommending the Council to go on and pay the salary of $200 a year or else to procure someone who would do the work for the pure love of the cause.

Mr. Wickson made the suggestion that while the office might be regarded as purely honorary, there might be an allowance made of, say $100 a year, for clerical work, which would go a long way towards relieving the Registrar from the drudgery incident to his duties. He thought if someone would volunteer for the work it would practically settle the question.

Mr. Gordon said the mere fact of someone volunteering would not settle it. A volunteer might have the enthusiasm, but the Council might not have confidence in his ability to carry on the work. It would not do

to have someone volunteer and get turned down; that would be most unpleasant. It was more a matter for quiet investigation.

Mr. Gray regarded Mr. Gordon's idea as very practical. He thought the Council was almost unanimously in favor of reducing the expenditure along that line; in fact, it must be done if they were to carry out the other ideas proposed; otherwise they would fall behind.

Mr. Aylsworth said that he had made the proposition to pay $100 as salary, but after hearing the discussion he had altered his views to this extent, that the office should be honorary, with the understanding that the occupant of the position would be authorized to charge for clerical work he had to get done by anyone else as part of the working expenses.

Mr. Gray said, as he understood it, the Registrar at present did make charges of that character for clerical work, such as for having notices printed, etc., and in that way he reduced his clerical work to a minimum.

The President said there was a great deal of clerical work in addition to that.

Mr. Gordon then moved the following resolution: "That this Convention, while placing on record its high opinion of the services of our present Registrar, and its opinion that the present salary of $200 per year is very moderate, in view of the quantity and quality of the service rendered, yet, in view of the present financial condition of the Association, and the idea of expending money to secure rooms and enlarge the scope of the Association, we recommend the Council, if practicable, to make the position of Registrar and Librarian honorary for at least one year, and that a liberal allowance be made for clerical work, etc."

Mr. Dick seconded the motion.

Mr. Gemmell suggested that instead of the words "a liberal allowance" the sum of $100 be inserted. He thought that would be a better way.

Mr. Gordon did not receive with favor the idea of naming any fixed sum. The sum of $100 might prove to be a great deal too much, or it might not be sufficient. That was something for the Council to decide. With Mr. Dick's permission, however, he would change the resolution to read, "and that all necessary clerical work to lighten the labors of the office be paid by the Association."

Mr. Wickson was in favor of inserting the sum of $100, and if the Registrar could save some of that amount let him have the benefit of it.

Mr. Gordon replied that $200 was the lowest amount that could be offered any man for his services. He did not think $100 would be any inducement to such a young man as was necessary to fill the position; it was not a man to whom the $100 would be an inducement that was wanted, but one whose inducement would be his enthusiasm for Architecture.

Mr. Gemmell still held to his opinion that $100, while it might not pay for the enthusiasm of the Registrar, would pretty nearly pay for all the clerical work required, and would be an inducement to an ambitious young man.

Mr. Darling, who had been absent from the room, asked what Mr. Gordon's motion was, and on learning expressed his entire agreement with it.

Mr. Pearson wanted to know if the Council could not get a man who would accept the office without remuneration. What was going to be done about the rooms? He thought something definite should be done. He did not think any man need be insulted by the offer of $100.

Mr. Darling said that the trouble about that was that it was tying the Council's hands. The Council had a perfect right to give $200, $100, $50, or any other sum they considered proper; therefore, what was the use of mentioning any sum in this resolution, which was only a recommendation after all. If a man could not be got for $100 what would the Council do? They would have to exercise their judgment after all.

Mr. Gordon's motion was then read by the Chairman and put to the Convention, and carried.

The Registrar then read the following notices of motion:

"By Mr. F. S. Baker: That there be a regular meeting of the Association one evening in each month, except during the summer, for the purpose of reading and discussing papers, etc.

By Mr. F. S. Baker: That a suitable medal be provided out of the funds of the Association, to be given to the student standing highest in the final examination.

By Mr. W. A. Langton: That the Association establish a tariff of fees as a guide to members in making charges for professional services.

By Mr. S. H. Townsend; To the effect that every year the Association place a mark of distinction upon a certain number of houses approved for excellence."

As Mr. Baker was unavoidably absent from the Convention, he would move the resolutions appearing after his name on his behalf, as he knew Mr. Baker desired to have them brought before the meeting. He thought, however, that both of the motions might be referred to the committee appointed to confer with the 18 Club, because they would come within the scope of the programme that those committees were arranging. The committee appointed yesterday to confer with the 18 Club had reported, and its report was that a committee of three be appointed in place of the committee of six.

Mr. Darling then moved that the members of the committee be Messrs. Wickson, Dick and the mover. He thought it was very much better to have a small committee.

The motion was seconded and carried.

Mr. Langton then moved, seconded by Mr. Wickson, that the first two motions be referred to the committee just appointed. The motion was carried.

Mr. Pearson inquired if the committee was to bring back its report to the Association? If so there would be none of these proposed meetings for another year.

Mr. Gray wanted to know if this was a sub-committee of the former committee, or what was it?

Mr. Darling explained that it was thought better to have a smaller committee to deal with the matter alone.

Mr. Denison asked when the committee had come to a conclusion as to what was best to whom would they report?

Mr. Langton said that the committee of three now appointed would report to the Council.

Mr. Langton then moved the resolution appearing after his name in the notice of motion, "That the Association establish a tariff of fees as a guide to members in making charges for professional services." He thought this tariff was very necessary as a guide to the Association and as their standard in court. If any one thought he ought to get more than the tariff rate for his services, or that he might accept less, that was a matter for special arrangement between him and his client; in the absence of such arrangement the tariff would be the standard.

Mr. Denison seconded the motion.

Mr. W. R. Gregg produced copies of a tariff which he said were printed by the Architectural Guild of Toronto, of charges based upon those of the American Institute of Architects, and suggested that the members look over them and see if the tariff was in their view a reasonable one, in which case they might save time by adopting it.

Mr. Gordon said the tariff in question was not that published by the Guild, but was published considerably before the one issued by the Guild, published by an earlier Association. Then the Guild thought some amendments were desirable, and later on one was published by the Guild, copies of which some of the members had in their possession.

Mr. Denison said that while it was true an amended pamphlet was published by the Guild, he thought the changes made in it were not as good as the rules in the copy they now held in their hands. He thought it would be desirable for the Association, if possible, to have a tariff uniform with that of the American Institute in every way. He was strongly in favor of the adoption of something similar to that adopted by the American Association.

Mr. Darling said he thought one was practically the same as the other. This tariff only stated that it was based upon that of the American Institute, but as a matter of fact it went further. As far as the question of a tariff was concerned, he understood that this was only recommended as a guide by the Association. He would not wish to belong to an association having a tariff binding on its members, for everyone was aware that human nature was only human nature. He thought all the information procurable should be obtained, both from the United States and England.

Mr. Wickson said one reason why the tariff they were looking at should not be adopted just as it stood was that there was provided a special rate for monumental or decorative work, "a special rate in excess of the above." That, he thought, was altogether too vague. In the case of a man who wanted an elaborately fitted up store it only gave the information that there would be a charge in excess. That was not enough, it ought to state from so much to so much more, so as to give a more precise idea.

Mr. Langton said he would move that the resolution be amended to read as follows: "That the Association adopt a tariff of fees as a guide to members in making charges for professional services, the tariff to be drawn up by a committee named by the President, which committee will report to the Council, and the Council shall have power to enact this tariff."

The resolution as amended being seconded by Mr. Denison was then carried.

Mr. W. R. Gregg inquired if there was any prospect of the tariff being adopted within the year? Had the Council power to enact a tariff?

The President replied that he thought they had.

The notice of motion by Mr. S. H. Townsend, to the effect that "Every year the Association place a mark of distinction upon a certain number of houses approved for excellence," was then taken up, and a letter from Mr. Townsend, explaining his unavoidable absence from the meeting, was read by the Registrar.

Mr. Gordon then moved for the appointment of a committee to consider the matter.

Mr. Darling said he was entirely opposed to the proposal; he thought it was a mistake from beginning to end, and he pointed out the absurdity of every little country town being stuck all over with tin labels like those of an insurance company. He thought if it was desired to do something to bring architects into contempt this was the very thing to accomplish it. Who, he asked, was going to be the judge of these houses, and to say that this or that was a good house, "designed by John Jones, architect."

Mr. Wickson thought the plan was one of the best and quickest ways of interesting the public in good architecture.

Mr. Langton said that he did not all agree with Mr. Darling. The proposal might present difficulties in working out, but he did not think it was at all fair to compare the proposed mark with the tin label of an insurance company. It might take the form of a stone let into the building, which by virtue of its own design would command respect. As to the question who was to be the judge in the matter, if this Association could not tell what was a good house he would like to know who could.

Mr. Darling wanted to know why the proposal was limited to houses? He thought the principle of the thing was utterly wrong. He thought it was only in cities like London, Paris and Berlin that such a project could be carried out. He thought a proper committee could only be got in such places.

Mr. Wickson said that was only a matter of detail. He had known competitions where the competition was decided by the competitors. He thought the Association could decide. He thought the scheme was a good one. They all knew that sometimes a badly designed house would catch the public, and yet, if they were told it was not a good thing they would be more careful about forming their opinion.

Mr. Denison thought the proposition if carried out would defeat the very object for which the Association was formed, to create a feeling of fellowship among architects. If members here and there were singled out, whose work might happen to be in fashion at the time, or who had, as it was called in municipal politics, "a pull——"

Mr. Langton:—No no, we have none of that.

Mr. Denison, continuing, thought that by picking out work here and there, and saying of it, "This is the genuine thing, none other need apply," a great mistake would be made. He thought the public were the persons to judge, and he thought, notwithstanding all that was said of the stupidity of the public, that in nine cases out of ten you were safer in their hands than in the hands of a committee. He thought every building ought to be let speak for itself.

Mr. Wickson said if the architects were not the proper ones to educate the public in such matters as this he would like to know how they were going to be educated; where else would they get their education in such matters.

Mr. Langton expressed his entire dissent from Mr. Denison's view that the public in this country were the best judge. He quite admitted that the architect's business was, as Robert Louis Stevenson said, "to please the bourgeois who carries the purse," but it did not at all follow that in doing this he should do what was unpleasing to himself. Because the public taste was bad was no reason why they should work down to it, but they should rather seek to educate the public taste up to that which is good. The proposition if carried out would afford a good opportunity of educating prospective clients in the lump, by bringing prominently before them work that was really good. He had been told the other day by a member of the Association as a good joke a remark that he had overheard in passing a group of ladies and gentlemen on the street. They were standing opposite a typical piece of claptrap design, close to which was a quiet but good piece of work by a member who was then in the room. The remark heard in passing was "How can anyone build a thing like that (pointing to the better building) when he can get a nice house like this!" (pointing to the other). Would not a mark on the better house have had some effect here to influence opinion?

Mr. Wickson thought Mr. Darling must have taken to turning "handsprings" of late. If he remembered rightly the last time this proposition was before the Association Mr. Darling quite approved of it. He thought if the convention adjourned for lunch Mr. Darling would come round to that view again.

Mr. Darling said that in nine cases out of ten public opinion would be found to be right. He did not mean to say that it did not go wrong in isolated instances, but where it had crystallized it was almost invariably correct. The instance cited by Mr. Langton was merely the isolated case, where a single individual had gone wrong. If any labelling was to be indulged in it would be wiser to begin with buildings like Toronto University and Osgoode Hall, but not with modern work. He did not think, however, that there was any necessity for such a course.

Mr. Denison said those in favor of the proposition had better go one step further, and put a label on every building designed by a member of the Association.

Mr. Aylsworth said there was a limit to all these things. If the proposition were adopted it should be on condition that no mark be placed on any building that was not at least twenty-five years old.

Mr. W. R. Gregg said he entertained strong objections to the proposition, because he considered it impracticable in Toronto, where they were all hunting so earnestly for a living that it was quite a common practice when an architect was being employed by some one for another architect to hunt out the employer and insinuate to him that the man he had was not just the right man for the work, and that he himself might do better. It had been proved in committees that that kind of thing had been resorted to in Toronto. With such a state of things existing they could not trust each other to carry out this proposition. It needed some one like Prof. Ware, of New York, some one who had gone through the work and become a professor in a college and could be trusted. Even Prof. Ware got criticized. Another objection was to be found in the fact that a building might be erected and bear this mark of distinction for ten or fifteen years. Then it might be necessary to make some alteration or addition to it, and the original architect might in the meantime, by reason of being on the wrong side of politics, or some such thing have lost his position, and the addition be designed by another architect, and be of such a character as to completely change the effect of the whole building. Now, in a case of that

kind, would the label be removed or what course would be taken? He thought the proposition quite impracticable. The motion said the mark was to be conferred for general excellence. Would that necessitate an enquiry from the mistress of the house as to whether the bath room plumbing or the fixed washtubs were satisfactory, or whether the back stairs were of sufficient width and so on? All these things, and hundreds of others, entered into the general excellence of a house, and made it impracticable to decide the question. The thing was impracticable, and outside of all that, who was going to take the time to attend to it? Here was a committee that had been appointed to look into the matter, and they had not had time time to meet about it, and the mover of the resolution was so busily engaged that he had not even time to come here and support his own motion.

Mr. Gordon said that although he had moved the resolution he had not yet spoken to it. He thought that all the remarks had been somewhat premature. One of their members had given a certain amount of thought to this subject, and had looked at it in various lights, and had thought it feasible to find some way in which our best buildings might be recognized, and so serve to aid in developing a better architectural taste on the part of the public. Without at all committing themselves to the scheme, he thought it would be quite proper to allow this gentleman and the committee associated with him to look still further into it, and bring in a report which would give more light. Then it would be possible to intelligently discuss the main proposition, whether the principle was right. He thought the committee should be appointed, and if they were he hoped they would do a little better than they did last year, when there was no meeting.

Mr. W. R. Gregg suggested as a better way of educating the public taste, a large public meeting, at which views of the best buildings in the city might be given, with an explanation by a lecturer of the points of merit and demerit, with free scope for criticism.

Mr. Darling moved in amendment to the resolution that the committee be dissolved for good. The committee had never met, and the convener could not find the time to come down and put his motion to the vote.

Mr. Gordon said that was not a motion, that was simply voting it down.

The motion was then put, and lost.

The Convention then adjourned from 1 o'clock until half past 2 o'clock in the afternoon.

AFTERNOON SESSION.

When the Convention was called after luncheon two papers were read by Mr. H. B. Gordon and Mr. J. Gemmell, on color in its relation to architecture.

SOME SUGGESTIONS AS TO THE CHOICE OF DIFFERENT COLORED BUILDING MATERIAL.

Building material must necessarily first be chosen for its structural fitness. This may be more or less modified by its adaptability to surfacing or ornamentation. But these two considerations should in their turn be modified by the suitability of the color of the material for the proposed building. For instance, an ornamental doorway of light colored sandstone may be quite correct from a structural view point, and its adaptability to ornamentation no one will dispute, but the desirability of its presence in the sombre solidity of a brown stone front is decidedly open to question. The structural fitness of a heavy projecting copper cornice may be accepted by many, and its easy adaptability to ornamentation is quite plain, but its presence as the crowning member of a light colored front is intolerable.

If as much thought was given to the color of the materials as to their form, there is no question but that our architecture would be more satisfactory.

While not presuming to formulate and express any laws for the guidance of choice in building materials, some suggestions have occurred to me, the statement of which may provoke fruitful discussion.

1. As to a general scheme of color for a building and its relative intensity in the various parts: The colors of building material, if there is any variation in tone, should be darker at the base of a building and lighter as they ascend. There is a structural suggestiveness in this. Dark colored materials (other things being equal) are usually stronger and denser than light colored ones. Hence, the darkest (which suggests the strongest) should be placed in the lower or supporting portions of a structure. Thus a most satisfactory combination is secured by making the lower part of a building dark brown stone, the body of it dark red brick, and the roof a lighter colored tile.

Perhaps the most unsatisfactory combination in general use is a foundation of light colored stone, a body of red brick, and a roof of dark slate. The roof problem is one of the most difficult questions of color in the ordinary cheap class of buildings. The cost of tiling is almost prohibitive for such structures, while the raw crudeness of a new shingle roof is offensive. The use of some light colored shingle stain is suggested as an expedient in cheap work, and the adoption of light colored green slate where the matter of cost is not so important.

2. Concerning the color of the body of work in relation to that of trimmings or ornamentation: As the body represents the more solid and structural portions of the work, it should generally be darker than the trimmings. This suggestion applies to nearly all the questions of broad surfaces with adjacent ornamentation. The object of plain wall surfaces being to give the needed repose and dignity to any composition, it naturally follows that the darker colored materials in the construction are the most satisfactory to use in this relation. Ornamentation, on the other hand, calling for the effect of light and shade, as in moulding and carving, should be in the lighter colored materials, as only in such can the best effects of sunshine and shadow be secured. In illustration of this, one has only to consider the tame and inadequate effect of a plain, smooth dressed, light stone wall, especially if the color be quite uniform and the joints disguised. If, however, the surfaces be rough rock face (which is Nature's ornamentation), the effect of light and shadow gives an entirely different impression.

On the other hand, one has but to consider the inadequate results from fine mouldings and elaborate carving in dark colored stone, and contrast it with the beautiful light and shadow effects produced by the same class of work in light colored material.

3. My third suggestion is one which is so simple as to be self-evident, viz., that the character of the design should dictate the color scheme of the materials.

Designs that rely on the disposition of the masses and not particularly on the quality of the detail are naturally suggestive of dark colored materials.

Designs, on the other hand, that are elaborate and emphasize detail are most effectively rendered in light colored materials. For instance, how much less satisfactory the general impression of the main buildings of the Chicago Exposition would have been if they had been executed in dark colored materials.

Breadth and solidity, with heavy members and correspondingly coarse scale of detail, are most effective when executed in the darker materials. Fineness and elegance of detail and general lightness of design is most effectively expressed in the lighter colored materials.

Milan Cathedral, with its multitude of pinnacles and flying buttresses, would not be a "dream of beauty" if the white marble was changed to a brown sandstone.

The fourth suggestion is that the general character and use of a building should in a great measure determine the amount of variety in color of material.

Buildings of a monumental character, and especially those that are intended to express solidity and permanence, should not have a great deal of variety in their color. Municipal buildings, banks, universities, and structures for similar uses should not be marked by materials of strong contrasting color. Many of us have perhaps regretted that designs otherwise stately and dignified have been marred by chequer board variations of different colored stone. Our only consolation is that the gentle hand of Time, aided by city smoke, will temper the colors and make the contrast less obtrusive. What is true in respect to monumental buildings also applies along different lines to ecclesiastical ones. Here the idea of harmony is most essential, while the avoidance of a gloomy effect is also necessary. Hence the use of light colored stone is most pleasing for churches, as it gives the necessary impression of unity and permanence, coupled with the suggestion of light and hope.

When domestic architecture is undertaken, the possible field of color in material is much enlarged. Here cheerfulness of effect is more important than dignity of expression. Probably the only limit, other than the general suggestions laid down in this paper, is the avoiding of fussiness and vulgarity.

And this leads to a 5th suggestion: The character of the surroundings must greatly influence the choice of color in building material. It will, I think, be readily granted that a house surrounded by trees and grass gives a much wider latitude in the choice of color in building materials and their use in contrasting positions, than one surrounded by other buildings. The harmonizing and softening effect of green surroundings in nature is familiar to all.

It appears to me that much more satisfactory results might be accomplished by architects if they made a study of the surroundings of their proposed buildings before deciding upon the color of the materials.

My next point I present with some diffidence, viz., that the style of Architecture adopted is to some extent a determining influence in the limit of color contrasts.

Pure classic Architecture, which depends so much upon the relative proportions of each part for its successful impression, must necessarily be limited in its variety of color. Any very strong contrasts of tone would distract the eye from the harmony of the parts.

Renaissance in its different variations affords the possibilities of greater scope in color, especially in the different storeys of the facade. Even here, however, care must be exercised to use the contrasts of color in the curtain wall, rather than in the classic framework of the design.

Gothic admits of a wide range of color in material, provided that the main lines of the design are not confused by sharp divisions of contrasting colors.

The less formal styles of Architecture, such as the Queen Ann, probably give the greatest permissible range of color in building materials. To those who favor the restlessness of these styles of design, the added restlessness of abundant contrast in color is an open door.

A 7th suggestion is in regard to the use of veined or mottled material of different colors or shades, such as marbles and some varieties of terra cotta. The general suggestion may be given that veined and mottled materials are for use in plain surfaces, where their variations of color are a help, and not to fine moulded or foliated parts, where their differing color produces confusion with the lines of the design.

And might I conclude with a caution about ascertaining the permanency of the color in any building material before adopting its use. I have in mind an important building, the body of which was built with a dark limestone and the trimmings with light Ohio stone. In process of years the color relations were reversed, the limestone bleaching nearly white and the sandstone darkening with age, smoke and dust.

The President, in expressing his appreciation of the papers read,* said that it is the color of a building which must impress the mind most forcibly because it is the color that lives most vividly in the recollection. When in the old country two years ago he had been looking at some work of Pugin, whom he had the pleasure of knowing very intimately, notably a building at Queenstown, now approaching completion, but upon which they had been working for forty years, and there were also some churches erected by him. The stone employed was a red trap, chiefly, and a limestone ranging from about a cobalt blue to lighter shades, almost pure white. The main walls of the buildings in question were of the red trap, and it was graduated in the way suggested by Mr. Gordon in his paper, while the trimmings, the cut stone work, the dressings of the windows and some of the salient points were of this blueish gray limestone, a very beautiful effect being produced in that way by the blending of the colors. The cathedral, which was by Burgess, was of light limestone, a magnificent structure. He had himself been a chorister in the old cathedral, and it carried many happy associations for him, but alas! it was gone, and the present magnificent structure was in its place. He thought it looked rather cold in its whiteness. Then there was another building of red brick, with white and grey limestone trimmings, a contrast one would expect to find rather marked, but the effect was anything but glaring, owing to the surroundings of turf and trees, which had the toning effect that green always seems to have. Although the contrast of the material in itself was perhaps rather striking, the combined effect was very beautiful.

Mr. Paull thought the members were very much indebted to Messrs. Gordon and Gemmell for their interesting and instructive papers. He had listened with much pleasure to Mr. Gordon's able treatment of contrasts in color, and drew from its conclusion that it was undesirable to build generally with very dark colored materials. He referred to the Guild Hall in the city of London which was of dark stone, and recalled the cleansing process which had been applied to it some fifty years ago. After having been cleaned it looked remarkably well, and compared quite favorably with the Royal Exchange, the Bank of England and other adjacent buildings.

The President said he remembered the period referred to by Mr. Paull, when there was a general movement in the way of scraping down and cleaning the walls of buildings in London, which spread to the provincial towns and resulted in a kind of crusade of renovation, but which, when enquired into, came to a sudden stop.

As there were other papers to be read and time was pressing the discussion was not prolonged.

Mr. E. R. Rolph, of the 18 Club, contributed a very interesting talk on "The Building of the Crow's Nest Railway," illustrated by a very fine collection of photographs, which were handed around among the audience. Mr. Rolph's description of the wonderful country traversed by the railway, and the methods adopted in the construction of trestle work and bridges was very interesting. The bridge he felt most interested in was one across the St. Mary's River, ¾ of a mile in length and constructed of piles. The average length of the piles was 80 feet, some running to 87 feet, 18 inches in diameter at the butt and 12 inches at the stock, and, as he put it, straight as lead pencils. These were driven by pile drivers having a drop of 100 feet. He described some wonderful fossil shell fish they discovered, some of them 10 feet in diameter and three feet thick. Specimens of smaller ones were collected and sent to McGill University. Then there was a wonderful bed of transparent oyster shells found at an altitude of 3,000 feet above the level of the sea, and also clam shells, showing that at some remote period there had been a sea there. The bridge over the St. Mary River was completed within six weeks from the time the timber was drawn on the ground, notwithstanding that a large part of the work was carried away by a spring freshet. Among the photographs displayed was one of the framing shop, in which the various erections were fitted together. As an instance of the rapidity with which the work was pushed on, he stated that in this shop on two occasions the entire framing of a 150-foot Howe truss had been completed in a single night. The duties of an architect out there, he said, were very different from what they are in Toronto. He had to get out a bill of quantities for everything, from tacks and nails to bricks and mortar, and order them from wherever he could get them. One piece of work he designed was a transfer slip at Kootenay landing. There was a fall in the Kootenay river there of 28 feet and to get down that 28 feet they had to pile on a grade of about 2½ per cent. running back for a mile and a half. The pile work ran right down about 8 feet below the lowest known water level. Then there was a top and a travelling stage with three tracks to bring it up to the level of the water or fall back as the water rose. Then from the end of the travelling stage, which was 239 feet long there was an apron 40 feet long, so that the end when it was lowered would go down to the scow loaded with the tram. The detail work of this had taken some eight weeks to do. Then he had to get together his material. The timber came chiefly from Vancouver; the cast steel and most of the rods and bolts from Montreal; the carriages were made in the shops at McLeod. The materials for this structure, indeed, were collected from both ends of the continent. He had not the satisfaction of seeing it completed before he left.

The President here informed Mr. Rolph that he had heard of the structure in question from an engineer who had seen it in operation, and who described it as a very successful piece of work.

Other work he had done in designing and erecting pile drivers and hoisting machinery, and laying out the work for the bridges. He also had to design living cars for the men, called jumbo cars, watering tanks, station and section houses, and coal sheds. A photograph of one of the latter was shown, designed to hold 1200 tons, and which coaled the engines automatically.

The Registrar, Mr. Langton, then read his paper on "The Architect's Part in His Work, as Exemplified in the Methods of H. H. Richardson."

This paper will be printed in a future number.

On motion of Mr. D. B. Dick, seconded by Mr. Kay, the thanks of the Convention were tendered to the gentlemen who read papers, and to Mr. Rolph for his contribution.

A vote of thanks was also passed to the auditors, Messrs. H. Langley and W. R. Gregg.

The election to fill vacancies in the Council caused by retiring members was then proceeded with, and Messrs. A. H. Gregg, W. A. Langton and J. A. Pearson were declared to be elected.

On motion, duly seconded, Mr. W. R. Gregg and Mr. Gemmell were appointed Auditors.

Mr. Power then moved a vote of thanks to the Past President for the assiduity he had shown in conducting the business of his office during the year.

Mr. A. H. Gregg seconded, and the motion was passed.

The retiring President, Mr. J. E. Belcher, of Peterboro', acknowledged the vote of thanks.

A communication from Messrs. Langley & Langley, offering to place at the disposal of the Association bound volumes of the "Builder" and the "Building News," dating back as far as 1868, was read by the Registrar; and on motion by Mr. Kay, seconded by Mr. Power, the offer was accepted.

The Convention was then declared adjourned sine die.

* Mr. Gemmell's paper, which for want of space is omitted, will appear in our February number.

STUDENTS' DEPARTMENT.

CANADIAN ARCHITECT AND BUILDER STUDENTS' COMPETITION.

THE publishers of the CANADIAN ARCHITECT AND BUILDER invite from architectural students and draughtsmen in Canada, competitive drawings for a Suburban Bicycle Club House. The building to be erected on a lot 60' x 150' in size, to have a southern exposure, and to cost not more than $6,000. It should contain bowling alley, billiard room for six tables, gymnasium, card rooms, reading and other rooms, necessary for a bicycle club. Provision must also be made for social entertainments, such as kitchen, etc.

Competitors are required to submit drawings to ⅛ scale showing south and east elevations of building, or it lieu thereof, a perspective trom ¼ scale plan drawn at an angle of 30 degrees to the picture plane ; also plans to 1-16 scale of all floors, including basement, graphic scale to be indicated on each sheet. Competitors are also asked to state briefly the materials proposed to be employed in the construction of the building.

Drawings must be made with pen and PERFECTLY BLACK INK on white paper or cardboard. NO BRUSH OR COLOR WORK WILL BE ALLOWED. Drawings should be so arranged as to admit of photographic reproduction in the illustration pages of the CANADIAN ARCHITECT AND BUILDER. The size of each page is 7 x 10 inches. No set of drawings must occupy more than two pages.

Competitors must send in their drawings under motto, marked "Students Competition," and addressed to "The publishers of THE CANADIAN ARCHITECT AND BUILDER, Confederation Life Building, Toronto," prior to 5 o'clock p.m. on Monday, February 12th, 1900. Each set of drawings must be accompanied by a sealed envelope bearing on the outside the author's motto and enclosing a card giving his full name and address.

The merits of the designs which may be submitted in this competition will be judged by a committee of the Ontario Association of Architects and of the Province of Quebec Association of Architects, whose decision shall be final. For the benefit of competitors, the judges will be requested to give a detailed criticism of each plan.

Three prizes are offered, as follows : To the winner of 1st position, $10 ; to the winner of 2nd position, $5.00, and to the winner of 3rd position, one year's subscription to the CANADIAN ARCHITECT AND BUILDER.

The right is reserved to publish any or all of the drawings.

NOTE.—Competitors are required strictly to observe and comply with the above instructions and conditions.

NICHES.

THE abundant use of statues by the Romans led to the adoption of the niche—a feature unknown in Greek architecture—as a convenient mode of inserting them within the surface of walls and thereby decorating them ; at the same time space was gained in interiors where if otherwise placed they would have taken up room. Niches frequently occur in Roman temples and baths, and were occasionally decorated with a frontispiece of small columns, with their entablatures and pediments, but were generally left plain and were for the most part semi-circular in plan, in which they usually terminated an arch or semi-dome, after the manner of a tribune or large recess, of which the niche was, in fact, a miniature copy. Niches, however, are very frequently rectangular in plan, and were also exhedræ, or recesses, in which case the latter formed arches vaulted hemicylindrically.

PERSONAL.

H. R. Woodley was recently appointed plumbing inspector at Rat Portage, Ont.

Mr. E. J. Lennox, architect of the new Municipal Buildings, Toronto, was recently presented by the employees under his control with a handsome marble clock and an appreciative address.

The new Minister of Public Works for Ontario, the Honorable Frank Latchford, was recently tendered a banquet at the Russell House by the citizens of Ottawa. There were present upwards of three hundred citizens, representing all classes and interests in the community, and many kind things were said of the guest of the evening.

Mr. W. H. Law has been appointed chief engineer and manager of the Hamilton Bridge Works Company, Hamilton, Ont. Mr. Law was formerly manager of the Central Bridge Works at Peterboro, and has had a long and valuable experience in this line. He is also an experienced civil engineer, and will undoubtedly fulfill with ability and satisfaction bis present position.

Mr. James Smith, of the firm of Smith & Gemmell, architects, Toronto, has just entered upon his twenty-first year as Secretary-Treasurer of the Royal Canadian Academy, and is busy preparing for the annual convention, which will be held this year in Ottawa in February.

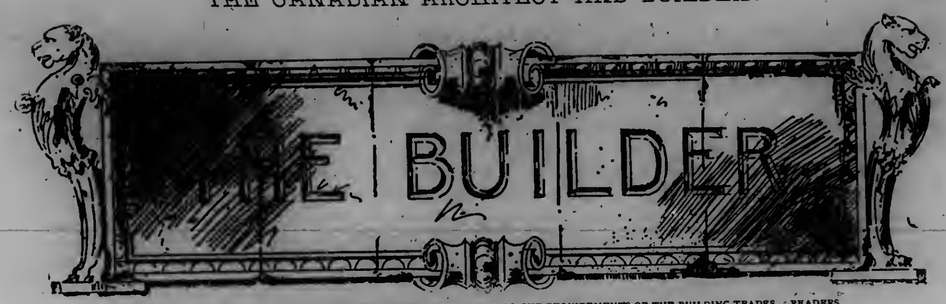
Samuel Walker, who was for seventeen years general foreman of the Grand Trunk Railway shops at Point St. Charles, has accepted the position of general foreman of the Dominion Bridge Company's works at Lachine. He was the recipient of a presentation at the hands of his late confreres.

LEGAL.

JAMES CONNOLLY VS. THE DETROIT BRIDGE AND IRON WORKS CO.—The plaintiff who was employed by the company on their works on the new Victoria bridge at Montreal, sued for $1,999 damages for having his leg crushed by a car on which iron beams were being conveyed to the position where they were wanted. The Lower Court dismissed the action on the ground that the plaintiff had been guilty of negligence in not blocking the whee of the car. Messrs. Justice Tashereau, Lorange and Lemieux, of the Court of Review confirmed this decision.

HAVEN V. HUGHES.—Judgement by Chief Justice Burton, in the Ontario Court of Appeal, on appeal by plaintiff from judgment of Boyd, C., dismissing action with costs. Action for injunction to restrain defendants from trespassing upon certain land and taking stone therefrom. The plaintiff claims the sole right to quarry under a lease from defendant Troup, which he asked to have reformed if necessary. The defendants purchased the land subject to the lease, and contended that, properly construed, it was only a license to quarry 50,000 cords of stone and no more, which they are willing to allow plaintiff to do. Held, not a case for specific performance. There is plenty of stone to cover the plaintiff's contract in addition to what defendants are taking, and their submission gives him all that he can ask for. Appeal dismissed with costs.

GREENWAY V. GARDINER.—Judgment by Justices Armour and Falconbridge in the Divisional Court at Toronto, on appeal by defendant from judgment of junior judge of County Court at Middlesex in favor of plaintiff in an action in that court for $141, balance of the price of a heating apparatus put into defendant's house by plaintiff, under a contract which required that the furnace should heat the house up to 70 degrees when the temperature outside was 10 degrees below zero. The defendant's counter claim for $290, amount paid for putting apparatus in proper condition was dismissed. The defendant contended that it was not sufficient that the thermometer should once have registered 70 degrees when it was 10 degrees below zero outside, but that it should be shown that the furnace was reasonably fit to heat the house. Held, that guarantees such as these in this case are to be construed reasonably according to the interest of the parties, and the more strongly against those giving them ; Cadill v. Carbolic Smoke Co. (1893), 1 Q.B.D., 256. The proper and reasonable construction is that the furnace if fed and managed as such heating apparatus is ordinarily fed and managed, would give 70 degrees of heat when the weather was 10 degrees below zero outside, and heat the rooms containing radiators to such degree. This being so the evidence is clear beyond reasonable doubt, that the apparatus did not answer the guarantees. Appeal allowed with costs. Plaintiff to have judgment in court below for $141 with costs, and defendant to have judgment there on her counter claim for $290 with costs. Plaintiff's judgment and costs to be set off pro tanto against defendant's judgment and costs.



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Finishing Eyebrow Windows.

IN our November issue we showed several examples of eyebrow windows, and in Figs. 1 and 2—(the latter by the way, having been set by the printer upside down), we showed how the window should be laid out in order to get the best results. The whole ground, however, was not covered, and we purpose discussing the subject a little more. The eyebrow window, when properly proportioned, and the work neatly performed, always produces a good effect, but when constructed as ordinarily done, it makes an ugly feature on a roof, and is sure to have a bad effect on the onlooker, often, without his being able to explain the reason why. There should not be too much height in the middle, and the reverse curve should die into the body of the roof without being noticed. A very good example is shown at Fig. 1, when it will be noticed the central height is quite small, and the shingles weave over the whole window without showing any line of division. The dotted lines show where the centres are from which the curves are described. This style of eyebrow is always effective. Fig. 2 shows how the frame-work for the window may be made, the ends of the curving ribs are seen in section. Unusually the sashes of an eyebrow window are hinged below, if they are intended to be opened at all, and the sweep of this one may be seen by the curved dotted lines. Drawn to a larger scale, is the working sectional drawing at Fig. 3, where the window-frame,

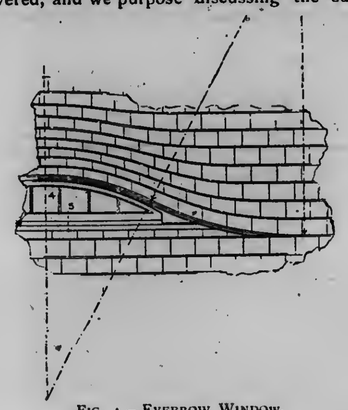

FIG. 1.—EYEBROW WINDOW.

FIG. 2—SECTION THROUGH ROOF.

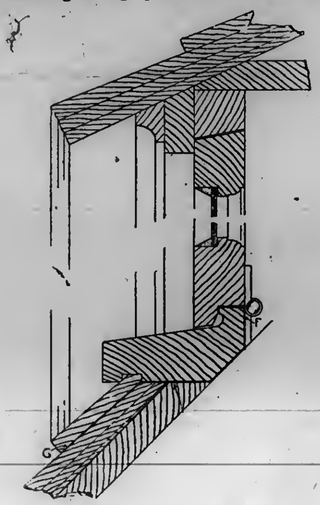

FIG. 3. SECTION THROUGH FRAME.

sash, and other finish are shown in place. The method of hinging, and scheme for preventing water from finding its way, inside, are shown. It will be seen that a metal flashing is placed on the roof under the frame, and extends from F to G as denoted by the arrows, which precludes the possibility of any leakage. All the illustrations shown in connection with the eyebrow window, in these columns, show square-cut glass and ordinary sash, but, in many places where this window is adopted, the sash would have a much better appearance if it was leaded and filled with white glass.

Curved Verandah Roofs.

WORKMEN often find it difficult to get the proper curves and lengths for veranda or other roof hips, and jack rafters where such roofs turn at an angle, and to aid them in overcoming this difficulty, the following diagrams and descriptions are presented : Let a b (Fig. 4) be the seat of the common rafter, and c b the curve or profile, which in this case is an ogee ; now draw the

seat of the hip or valley , as b d; then divide a b into any number of spaces, as 2, 4, 6, etc.; from these points draw lines at right angles to a b intersecting the profile of the common rafter and the seat of the hip, b d ; then from these points on the seat of the hip continue lines at right angles to seat of the hip, making 9 10 on the common rafter, and 7 8 on the hip rafter equal to 7 8 on the common rafter ; 5 6 on the hip equal to 5 6 on the common rafter, etc.; the points thus found are

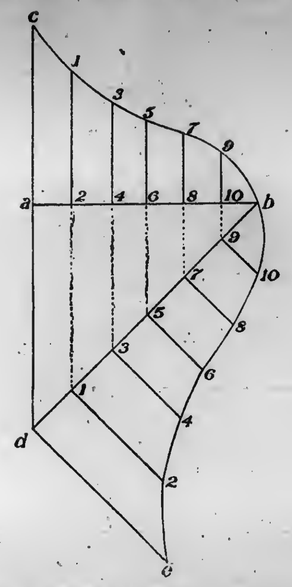

FIG. 4.—CURVES FOR VERANDAH HIP-ROOFS.

points on the profile of the hip rafter ; then connect b 10, 10 8, etc., with the curved line as shown, thus giving the profile of the hip rafter. This should be readily understood, for if we raise the curved line c b, until it stands plumb over a b, we get the common rafter in position. Then, by lifting c b until the curved line stands plumb over the seat d b ; we get the hip curve in position, and a line laid on c and e, or from 1 to 2 on the curved lines, will be level or horizontal ; thus proving the truth of the solution. In order to get

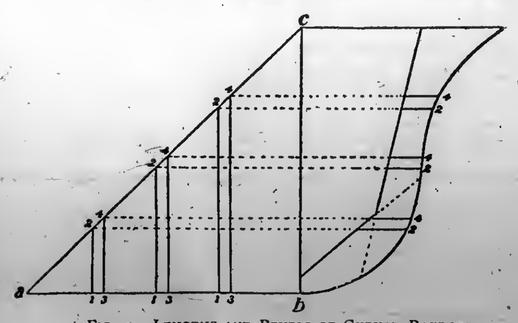

FIG. 5.—LENGTHS AND BEVELS OF CURVED RAFTERS.

the jack rafters of the proper curve and length, we draw the plates a b and b c in Fig. 5 ; and the seat of the hip, as a c. Now draw the rise and profile of the common rafter; as c e and e b ; lay off the seats of the jack rafters, as 1 2, 3 4, etc., making 1 3 the thickness of the jack rafter. Continue these lines from where they strike the seat of the hip, parallel to a b, until they strike the curve of the common rafter. Then b 4 will be the length of the jack rafter, 4 will be the long length and 2 the short length, or 4 will be the line of the cut on one side and 2 the line of the cut on the other side. The curves on these rafters must be made by the same pattern as that used for the common rafter, and the lengths, as shown, must be taken from the bottom of the pattern, as at b ; the curves will then all work on the same plane.

Drainage.

WHEN a soil drain has to be fixed inside a house, or outside it where a leakage from it would find its way into the house or under the footings, cast iron with caulked lead joints, is preferable to glazed or stoneware tiles, whatever kind of joint may be adopted ; the pipe not being less than ⅜ in. thick in any part for a 4 in. or 5 in. diameter, and thicker for drains of a larger size. Instead of laying an iron drain in the ground, where it is inside a house it is better that it should be carried on the fan of some wall, or be suepended from the floor, or be carried in a subway, or in a tunnel, or creeping-trench, specially built for the purpose, of bricks or cement, with openings here and there so that the pipe can be examined from time to time when desired. In order to secure proper connections to main sewers, it is always best to get the local authorities to do the work, as they know best how to go about it, and they generally perform the work in compliance with municipal rules prepared for the purpose. When drains are solely meant for rain water, much less fall is required than for sewage. Generally a velocity of 2½ feet per second is sufficient in order to carry away any dust and dirt that may have accumulated on the roofs between showers. The drains should be surrounded by concrete when passing through buildings or near the roots of trees, or when likely to be disturbed. The provision for the rapid clearance of rain fall should be ample, and should vary to meet the average annual rainfall according to the district in which the building is located. If there is no regular sewage system, and the soil is carried to a cesspool from the house, the greatest of care should be taken to have every inlet to the drains well trapped and thoroughly ventilated. There should also be suitable vent from the covered cesspool, with a proper goose neck attached. A small vent, leading to the outside of the house should be attached to every sink outlet, for, as a rule, the sink traps are not overly efficient.

PUBLICATIONS.

The Plumbers' Trade Journal of New York issued to the trade a Christmas number which was attractive in appearance and interesting in contents.

Mr. Horace B. Hudson contributes to the Review of Reviews for December an account of the movement to establish a national forest park in Minnesota, near the headwaters of the Mississippi.

The David Williams Company, 232 William Street, New York, has recently published a book by Mr. F. T. Hodgson on "Estimating Frame and Brick Houses." It comprises 147 pages 5×7 inches in size, illustrated by means of scale drawings and constructive details. This appears to be a practical and fairly comprehensive work explanatory of the method of estimating for labor and materials as applied to domestic buildings of wood and stone. The book is well bound in cloth and sells at $1.00 per copy.

The new court house building at St. Thomas, Ont., was formally opened a fortnight ago, and is said to be a handsome structure.

MR. A. FRANK WICKSON,

PRESIDENT ONTARIO ASSOCIATION OF ARCHITECTS.

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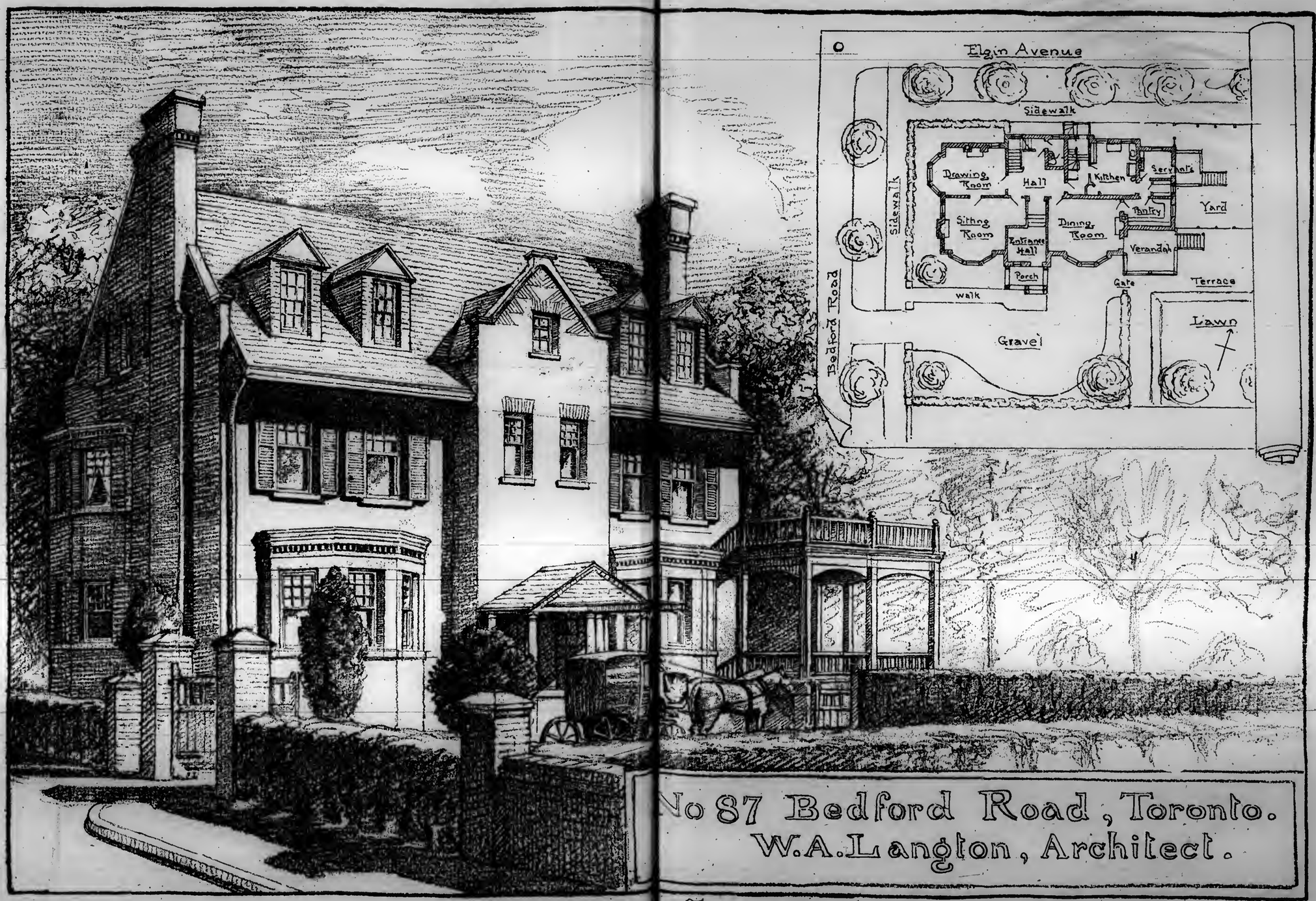

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W.A. Langton, Architect.

From a water colour drawing by S.A. Heward

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CANADIAN ARCHITECT AND BUILDER.

VOL. XIII.—No 2. FEBRUARY, 1900 { PRICE 20 CENTS. $2.00 PER YEAR.

—THE—

CANADIAN ARCHITECT AND BUILDER,

A Monthly Journal of Modern Constructive Methods.

(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD).

PUBLISHED ON THE THIRD WEDNESDAY IN EACH MONTH IN THE INTEREST OF

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The C. H. MORTIMER PUBLISHING CO. of Toronto, Limited,
Publishers,
Confederation Life Building, - TORONTO, CANADA.
Telephone 2362.

Branch Office: NEW YORK LIFE INSURANCE BUILDING, MONTREAL.
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SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to foreign subscribers is $2.50. Subscriptions are payable in advance. The Journal will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrears of subscription paid.

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Prices for advertisements sent promptly on application. Orders for advertisements should reach the office of publication not later than the 12th, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.

Contributions of value to the persons in whose interest this journal is published are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

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Prices.

PRICES of many lines of building materials continue to advance. Recent increases include tin plates, galvanized sheets, window glass for future delivery, varnishes, linseed oil. In sympathy, prices of heating furnaces have also been advanced 10 per cent. Prices have not advanced in Canada in nearly the same degree as in the United States, nor to an extent which should put a check on building enterprise. It is to be hoped that the limit of advance has almost been reached, and that those who have the intention to build the coming season may not find in the prospect of increased cost cause for hesitation and postponement of operations. It seems reasonably certain that no decline in prices of materials is likely to take place for at least six months to come, and probably not then. Therefore buildings which are to be erected this year should be commenced as soon as possible.

Canadian Society of Civil Engineers.

A NEW and commendable departure was made in connection with the annual convention of the above society this year. The convention opened in Montreal, where the usual routine business including the election of officers took place. This was all disposed of on the first day. The remaining three or four days were spent in Boston in inspecting important engineering works and in fraternizing with the engineers of that city. It is gratifying to note by the address of the retiring president that the membership of the society is rapidly advancing and that its surplus funds have already reached the sum of $10,000. The society is asked to consider ways and means for the profitable expenditure

of this money, failing which a reduction will be made in the fees of members. This is a somewhat extraordinary as well as most satisfactory state of affairs. The retiring president dwelt strongly upon the advantages which would follow the closing of the profession to all but qualified engineers. The presidency for the present year has fallen into the hands of Dean Bovey of McGill University, who may be relied upon to maintain at the highest point the progress and usefulness of the society.

The School Art-League Movement.

Two very interesting lectures on architecture were recently given by the Rev. Mr. Shortt, under the auspices of the Art League of the Huron street Public School, Toronto. In the first of these, entitled "How to Read Architecture," the leading characteristics of the different periods of architecture were clearly explained. By means of lantern slides there were thrown on a screen charming illustrations of historic buildings embodying these characteristics. Thus was traced the rise and decadence of the forms of construction and decoration which serve to distinguish one period from another in the history of architecture, and the audience, composed largely of pupils and teachers of the public schools, were taught how they might distinguish to what period the design of a particular building belonged, and also in what degree a right use had been made of the elements of the design. It was gratifying to hear the remark from the chairman, Mr. J. L. Hughes, Inspector of the city schools, that it had come to be recognized that education should mean more than cramming the head of the pupils with arithmetic and such like subjects—that ability to appreciate beauty of form and color was even more important—and that school buildings should not only be structurally secure and planned to meet the requirements, but should also within and without be in keeping with established canons of good taste. Art Leagues have already been organized in twenty of the public schools of Toronto, and the movement is rapidly extending. If carefully guided, it will do much for art and architecture in the years to come. The movement is under the direction of an Advisory Board, composed of artists, architects and other qualified persons, who will decide in what manner the funds of the Leagues shall be expended. These funds are raised in a variety of ways, such as by voluntary subscription, membership fees, public entertainments, etc. It is gratifying to learn that the new school buildings and additions to school buildings to be erected in Toronto this year, will be carried out in accordance with the views of the Advisory Board of the School Art Leagues. There is also the possibility that the designs for public school buildings to be erected in the future may be thrown open to competition among the architects of the city. Such competitions would also be conducted under the direction of the Advisory Board. The Superintendent of Buildings is understood to be in full sympathy with the proposal.

St. Lawrence Market Improvement.

An unfortunate condition of affairs has developed in connection with the St. Lawrence market improvement in Toronto. The Dominion Bridge Co., of Montreal, contractors for the steel work, including the immense roof, recently declined to proceed unless the strength of the supporting brick piers was increased. Their contention, based upon calculations, that the piers were incapable of withstanding the combined pressure of the roof and wind, was disputed by the architect. The City Council then appointed as experts Messrs. J. Wilson Gray and the City Engineer to examine and report upon the construction and strength of the piers. The Dominion Bridge Company engaged for the like purpose Prof. Galbraith and Mr. J. A. Duff, of the School of Practical Science, Toronto. These gentlemen all declared as the result of their calculations and examination of the work that the piers were not strong enough for the duty which they were intended to perform. Against these unfavorable reports Mr. Siddall submitted the opinion of Mr. David Ogilvie, of Montreal, to the effect that the piers would safely carry the pressure to which they would be subjected. After hearing these conflicting reports and the statements of the architect, the Council decided to appoint an associate architect, who should be held responsible for the proper completion of the work and be paid by the Council out of the original architect's fees. This adjustment of the difficulty, while not as satisfactory as could be desired, is, considering the circumstances, perhaps the best that could be made. Prior to the commencement of the work Messrs. Lennox and McCallum, two of the city's experts appointed to examine the plans and specifications of the competing architects, concluded their report in the fellowing words:—"Your experts are also of the opinion that there has not been money enough provided for the erection of a substantial building of such dimensions as are asked for under the suggestions contained in the report of the market commission, and your experts further take the liberty of stating that in their opinion your Board will gain the desired end much more satisfactorily by either having plans prepared on a much less extensive and expensive scheme, or by providing sufficient funds to have the large and present suggested scheme carried out." This opinion was reiterated and emphasized in a subsequent report after the experts had by direction of the Council consulted with the authors of the various plans submitted. Mr. C. H. Rust, another of the city's experts, in his minority report to the Council, thought the work might be carried out within the limit of cost of $150,000, but suggested that "It might be advisable before tenders are called for to engage a consulting architect to advise upon the amended plans and to see that they comply with the alterations and additions as suggested." These recommendations of the experts were disregarded and the work proceeded with, with the above mentioned result.

The Toronto Public School Board has appointed a special committee on heating and ventilation for the purpose of obtaining information which will be valuable in considering any question in this connection. The committee have decided to make inquiry of the school boards in about forty Canadian and American cities as to their experience and opinions of the different systems in use. They will also endeavor to get the advice of the experts associated with the provincial and city medical health departments.

Mr. Howard T. Barnes, of Montreal, Joule student of the Royal Society of Canada recently dellvered a lecture at Cornell University on the specific heat of water. The lecture was illustrated with lantern slides of apparatus used in experiments on which Mr. Barnes has been engaged for three years past.

THE GRANGE, TORONTO.

The confidence with which the early settlers in Ontario built for the establishment of a family surprises us later inhabitants who have seen the constant change that is going on in the character both of towns themselves and of the localities within towns. In England, from which most of these early Canadians came, the uncertainty of site had not then become recognized. Provincial towns had hardly begun to spoil the country surrounding them, and London had not yet drawn to itself the people of leisure in the county—the junior members and spinsters of the county families who used to live in those simple but dignified residences which we see, now too often in a state of reduced respectability, in the county towns of England. The family residence, occupied from generation to generation, was a familiar idea in England; and when young Englishmen of family came to Canada to establish themselves they took it as a matter of course that in founding a family they should also build a home.

THE GRANGE, TORONTO—WINTER VIEW.

Among residence in Ontario built with this idea the most fortunate is The Grange, Toronto. Its neighborhood is still a good residential quarter of Toronto; it is still surrounded by ample grounds, and is still kept up in perfect order as a residence in the estate of the family for which it was built.

The Grange was built in 1817 by D'Arcy Boulton, eldest son of the Hon. D'Arcy Boulton, at one time Solicitor General of Canada and afterwards Justice of the King's Bench, who was the original Englishman in this case. Judge Boulton himself lived in the house and it is most likely from the style of the building that he had a good deal to say about its design.

The house is said to have been named after a family estate in England. The model was evidently one of those Georgian residences of the English county towns, to which allusion has just been made. It was the first brick house built in its neighborhood, and its cost, $4,000, must have been unusually great. The bricks were made on the spot. One of the moulds was preserved until it was destroyed by mistake a few years ago.

The main part of the house was first built. The first wing was added soon afterwards. The wing to the extreme left was originally a grapery, but was converted, not many years ago, into a library by Professor Goldwin Smith, the present occupant. The ground floor is now given up to living rooms with the exception of a couple of service rooms to the north; but it is likely there were two or perhaps three bedrooms on this floor at first. There was originally a room where the stair case now stands and the stair; a narrow circular stair, such as was common at the time when the house was built, was advanced to the line of the central passage and must have been lighted only from the hall door lights. The beauty of the present hall is due to the Hon. William Cayley, who planned it. The hall is carried through the house and lighted over the stair by a large north window filled with stained glass. The stair is massive and dignified in detail; the color of the stairs, doors and other wood work is black—the beautiful warm black of black walnut, supported by several black walnut cabinets and contrasted by white fluted columns which divide the stair case hall from the front hall.

It is worthy of note that the service department remains in its original position in the basement. It is no doubt to this that is to be attributed the entire freedom from damp and decay which makes the Grange as fresh and as fit to live in now as when it was first inhabited. There is no doubt that a return to the basement kitchen would not only free house planning from much embarrassment and afford commodious service rooms at little

expense, but would greatly improve sanitary conditions of the dwelling.

The excellence of the external design is no doubt to be accounted for by the fashion of the times, which made a knowledge of architecture as it was practised then a

THE GRANGE, TORONTO—AUTUMN VIEW.

usual accomplishment for a gentleman. The design is simple enough—a well spread front with a symmetrical and even arrangement of window openings and wall surface; a hipped roof brought to the front in a wide pediment of a Greek pitch, relieved from dullness and combined with the lower part of the front by a circular window in the centre; and all adornment concentrated at the middle of the front in a grey stone portico which, though not very well planned itself, is as a mass well proportioned to the front. The portico was originally of wood but Mr. Goldwin Smith has had it taken down and replaced by an exact copy in stone. The satisfaction conveyed by the presence of stone, where stone ought to be, is great. The stone portico is reinforced by stone steps flanked by large stone flower pots. These steps both give emphasis to the terrace, on which the house stands, and connect it with the level of the lawn.

It is this lawn with its trees which is the great glory of the Grange. By good fortune or good management the grounds about the house have not been cut down too much in the process of trimming the estate as the city grew round it. When the house was built the estate was a farm property extending from Queen street, which was the main east and west high road, half way to Bloor street. The entrance was on Queen street near McCaul. From this a drive swept up to the house. Stories that have been handed down—of an English officer who lost his way in the Grange woods; of an Indian appearing suddenly in Mr. D'Arcy Boulton's room; of a bear being driven off the pasture near the house by Judge Boulton's pair of carriage horses striking at it with their fore feet—all indicate a state of wildness far removed from the cultivated beauty of the present lawn. Yet this lawn must have been planted long ago to judge from the size of the elms. The largest is eleven feet in circumference. The present arrangement of the grounds in front must have been made some time before 1844, when the land for Saint George's Church, just outside the gate, was given by Mr. D'Arcy Boulton. The grounds were no doubt laid out under the direction of Mr. Cayley who is known to have planted the elms. The gates are directly in front of the entrance and are connected with it by a wide gravel walk, 300 feet long. The carriage drive approaches the entrance by a circular sweep of a diameter the same length as the walk. Outside the circular drive and its connections with the rear are plantations along the boundary fences on the East and West. The plantations have the effect of a screen; but the trees are set very open, so that grass grows underneath. The area bounded by the drives is kept in turf. There is ample room for tennis lawns in the segments between the straight walk and the circular drive. The elms give shade without being an obstruction. They

THE GRANGE, TORONTO—SERVANTS' COTTAGES.

are arranged in clumps around the drive at fairly even distances; but no two clumps are alike in number or arrangement of trees. Any appearance of formality is upset by the group of two near the centre of the circle, on the opposite side of the central walk to the large group near the lodge. The effect is one of park like beauty which we may hope will long be preserved to Toronto. It is an example of what may be done with fifteen or twenty trees to create a beautiful place; requiring neither the great first cost nor so great an outlay in keeping up as the formal garden.

The grounds at the back contain the necessary garden, conservatory, yard and stable arrangements, and the residence is completed as a self contained establishment by a row of servants' cottages at the Beverley street entrance, which, with their flowers and creepers and the trellised vine over the stable yard behind, make a pretty group.

There was at one time a race course on the Grange property behind the house. This ceased to exist about 1850. All that remains of it is a portion of the grand stand, forming part of a green house in the garden.

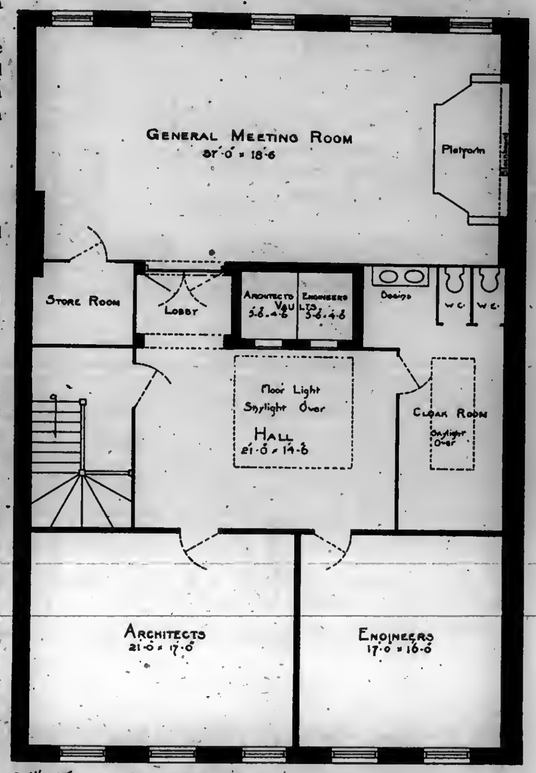
ONTARIO ASSOCIATION OF ARCHITECTS.

Two meetings of the Council have been held since the annual convention. Mr. W. R. Gregg, 66 Victoria street, has been appointed registrar, and Mr. C. H. Bishop, auditor. The several committees appointed for various purposes were not in a position to report yet, but are at work.

It has been decided to lease the rooms at No. 94 King street west in accordance with the following recommendation contained in the report of the consulting committee presented at the annual convention, viz.: "They have procured an option upon rooms suitable for the uses of the Association. The rooms are situated at 94-96 King street west, Toronto, between York and Bay streets. It is proposed to arrange them as in the accompanying plan, so as to share the premises and cost with the engineers. The rooms will occupy the second floor, but will have a separate entrance from the street, and every member should have a key to the door. The rent for each of the societies associated as tenants will be $150 per year. The alterations necessary to arrange the floor as planned will be made by the landlord. Heating and caretaking will be provided, but not light." Some slight alterations to the arrangement of the rooms as shown on plan will be made.

It is intended that the examinations shall be held in March. Students wishing to enter for the examinations should send in their names to the Registrar, Wm. R. Gregg, 61 Victoria street, Toronto. The following gentlemen compose the Board of Examiners: Prof. Galbraith, (chairman), Messrs. C. H. C. Wright, S. G. Curry, R. J. Edwards, W. R. Gregg, Grant Helliwell, S. H. Townsend, E. Burke and J. Wilson Gray.

A full meeting of the Council will probably be called within a few days to consider other matters in connection with the various schemes suggested for the improvement of the Association. In next issue further particulars will be given.



94½-96 KING ST. WEST TORONTO.

SECOND FLOOR PLAN

THE CHICAGO ARCHITECTURAL CLUB EXHIBITION.

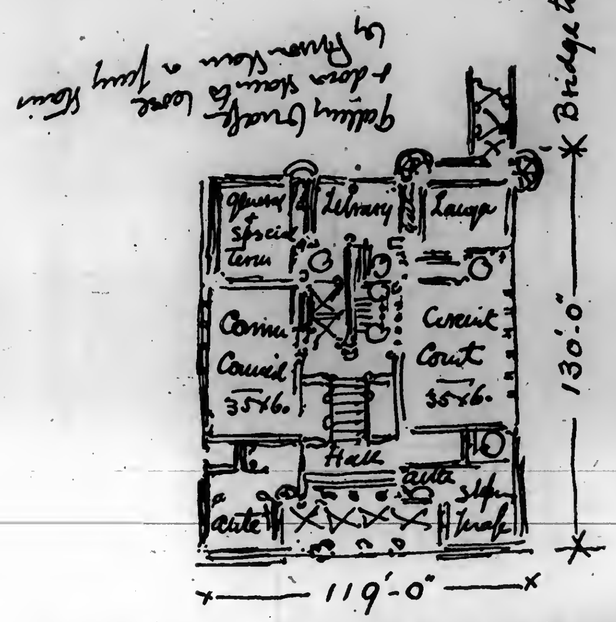
THE Thirteenth Annual Exhibition of Works of Architecture and the Allied Fine Arts, will be held at the Art Institute, Chicago, under the auspices of The Chicago Architectural Club, from Tuesday, March 20, to Monday, April 2nd. The Exhibition of original works, not previously shown in Chicago, will include: Architectural Drawings, and Sketches in Plan, Elevation, Section, Detail and Perspective, in all renderings; Projects for Public and Monumental Work; Interior Decorations and Furnishings (Sketches and Samples); Architectural and Decorative Glass and Mosaic Work; Architectural Metal Work; Sculpture—Architectural and Decorative—Models, etc.; Landscape Architecture. If necessary, in order to complete an exhibit, a drawing previously exhibited, will be accepted.

The official Bulletin of the National Master Plumbers Association has ceased publication.

The world's progress for 100 years is the best recommendation for advertising; as a lesson well learned recommends its teacher. A century ago business was largely a matter of local exchange; a manufacturer in the east having to deal in the east because the west was to a great extent a stranger, unacquainted with eastern products. The evolution of newspapers and magazines has leveled all commercial barriers. The man in the east advertises and the advertisement does the duty of a traveling salesman in every town that is reached by its publishers. The inventions of a century, quick and satisfactory systems of printing, and facilities for transportation, have evolved a practical art that has a monument in every successful business the world over.

ON THE ARGHITECT'S PART IN HIS WORK, AS EXEMPLIFIED IN THE METHODS OF H. H. RICHARDSON.

When an architect sues for his fee and his drawings are brought into court as evidence of the work he has done, the opposing counsel at once proceeds to make the discovery that the drawings have not been made by the architect at all but by a draughtsman. Investigation of the draughtman's salary and estimation of the length of time taken by him to make the drawings which are shown in court reveals what seems like a scandalous disproportion between the cost of the drawings and the fee that is asked for their use. To the jury it appears as if the man who made the drawings did the work and the time he took to make the drawings represents fairly well the time that should be charged for; nor are they disposed to be at all indulgent in a matter which appears to them perilously near a system of sweating the draughtsman.



PLAN OF CITY HALL, ALBANY.
(Autograph Sketch by H. H. Richardson.)

Both counsel know better; but they are not so sure about it that the opponent's counsel need feel any scruple about raising the objection for the chance of what there may be in it, or that the counsel for the architect can clearly explain to the jury that there is nothing in it; that an architect's work is not to be measured in that way.

I propose to illustrate the architect's position by an account of the method of work of H. H. Richardson, an architect who collected $50,000 in fees in a year, and who never made one stroke of the drawings upon which these fees were based.

In taking Richardson as an example I am taking a man who was par excellence an architect. His office was, above all things, a place where original work, or to use his own phrase, his "own work" was done. From the beginning, in the plan which was his conception of the idea contained in the problem, to the details of finish which were in accordance with his taste, it was his own—so much his own that when the rush of enthusiasm for his work produced imitators all over the country, though it was thought at first that the American style had been founded, it was soon seen that the charm was in a personal quality that could not be caught and that the style apart from the man was nothing.

How were these designs produced? One would suppose that he must have drawn everything himself; to the extent at least of the essential proportions and features, if not the mouldings and ornaments.

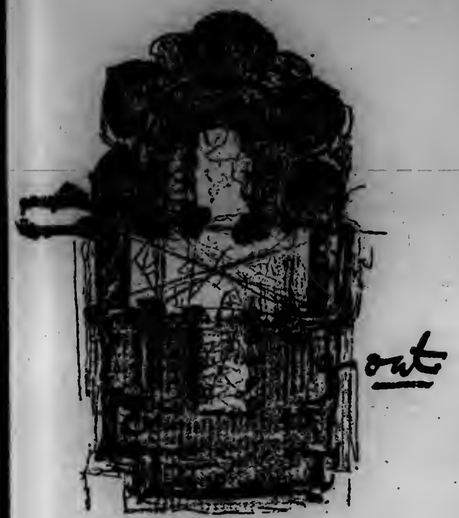
The extent of his drawing was a plan scribbled on a sheet of note paper; often done in bed, where the state of his health obliged him to spend much of his time, and where he had the best opportunity for thought. A plan two or three inches square embodied his idea. The ultimate result of his study was inked in over the mass of soft pencil marks with a quill pen; and sometimes principal dimensions were figured. That was usually the end of his work on paper.

There is in Mrs. Van Rensselaer's Life a sketch for the Harvard Law School which shows an elevation also, but I do not think that he often defined the elevation in this way.

This note went to the head draughtsman who worked in a room apart in constant consultation with Mr. Richardson. The nature of that consultation was to a great extent criticism merely and the suggestion of leading ideas; but never, I think, so definite as to supersede thought on the part of the draughtsman. The first criticism of the kind that I heard has remained in my memory. It was just after some big works had possessed the mind of the head draughtsman with ideas of grandeur. He was at a table near me designing the entrance to a house at Albany when Mr. Richardson passed and, after looking over his shoulder for a moment, said, "C'est la delicatesse qu'il faut maintenant mon ami," (it is refinement we want now) and went away. It was delicatesse he got. The fenestration of this house was in charge of another draughtsman whom Mr. Richardson kept rubbing out his windows all morning until they came right and were accepted with the remark "there is nothing like rubbing out." The only case in which I worked from one of these sketches was a sketch plan for a large apartment house. The sketch came to me on a piece of note paper showing two large bays in front running through all floors. This was the design. The living rooms connected with the front were indicated clearly; an interior court yard was shown and the living rooms connected with it but the back was a mere scribble with "service" written across it, and as far as I recollect, such guides as "lift," "dust" and perhaps one or two more hints of the peculiarities of the service department of a flat.

Usually these original notes did not appear in the office but were guides for the head draughtsman alone, who made from them small scale sketches for the client. When the matter was settled the small scale sketches were put into the hands of one or more draughtsmen; usually a pair, one in charge, the other assisting. When the actual work was done many hands might ink and trace; even better hands than the original men who did the drawing (as we understand the word) sometimes dropped their work, if it could wait, to take a hand in wiping off a job which could not. The specification was usually written by the senior of the responsible draughtsmen, and one of this pair often acted as superintendent while the work was in progress, especially if the work was out of town. For larger work there was a larger gang than two, but the principle was the same; everybody was responsible. Mr.

*Paper by Mr. W. A. Langton, presented at the annual Convention of the Ontario Association of Architects, January, 1900.



PLAN OF CATHEDRAL CHURCH.

Richardson designed, the head draughtsman or draughtsmen executed his design and the junior draughtsmen made from it the working drawings and specifications. There was, of course, much mutual consultation, criticism and advice; but Mr. Richardson himself was usually away most of the day, when in town, and was half the time out of town; and the final authority in construction, who was called the foreman, was away for months together superintending the erection of the largest work. So it was a school of artists or art students of all grades all helping one another in that mutual agreement which came from their having but one aim and one idea—to carry out Mr. Richardson's design. When it came to details there was even more apparent freedom from the fact that a design would be from beginning to end a draughtsman's own work; but it was not his own in the sense of being a departure in any way from Richardson's recognized feeling. Where, when or how he stated his ideas about detail it was not always easy to trace, but all the office knew what he liked. He did not fail to praise what had turned out to be successful and in course of time the tradition of what pleased him was established, for detailers were particularly keen to have their work approved as it was in a real sense their own though it was designed to meet his views.

The conclusion which, I think, we may draw is that Richardson's very method of work had much to do with the ideal character of his design. It was to the idea he devoted himself entirely and it was the essentials to its expression that he looked for in the drawings and succeeded in bringing out of the draughtsman. So that to return to the juryman's point of view I think we may say that not only was he entitled to his fees without having made any drawings himself, but it was the very fact of his not having made drawings himself that gave his work that quality which made the public glad to give him the large fees he asked.

ENGINEERS' CLUB OF TORONTO.

The annual meeting of the above Club was held on the 13th inst., when the following officers were elected: President, Kivas Tully; vice-president, Prof. John Galbraith; directors, C. H. Rust, R. W. King, T. R. Rosebrugh; treasurer, T. B. Speight; secretary, Willis Chipman.

In the evening the annual Club dinner was held at the Rossin House. Upwards of thirty members and guests sat down to the temptingly spread tables. The venerable president of the Club, Mr. Kivas Tully, presided, the vice chair being occupied by Prof. Galbraith. Among those present were: T. S. Speight, C. M. Canniff, J. G. Ridout, H. F. Duck, C. E. Cooper, W. A. Clement, Geo. Mickle, A. M. Wickens, E. J. Philip, Jno. Williams, Fred. Dumford, R. F. Tate, R. J. Parke, Maj. Gray, Geo. Hanning, W. A. Johnson, Geo. White-Fraser, T. S. Scott, W. M. Brodie, A. L. Gray, J. A. Ellis, C. H. C. Wright, Jno. A. Duff, J. E. Maybee, R. W. King, C. H. Rust.

Following the toast to Her Majesty the Queen, and the singing of the National Anthem, the chairman proposed a toast to "Canada," to which fitting response was made by Messrs. J. G. Ridout and Henry F. Duck. "Engineering," proposed by Prof. Galbraith, drew forth a series of interesting remarks from Messrs. C. H. Rust, R. W. King, Geo. White-Fraser, E. J. Philip and A. M. Wickens, the two latter gentlemen representing more particularly the Canadian Association of Stationary Engineers.

The proceedings were enlivened by instrumental music and a number of excellent songs.

Already sixty persons have joined the Club and paid the yearly fee of $5, so that its success would seem to be assured.

PERSONAL.

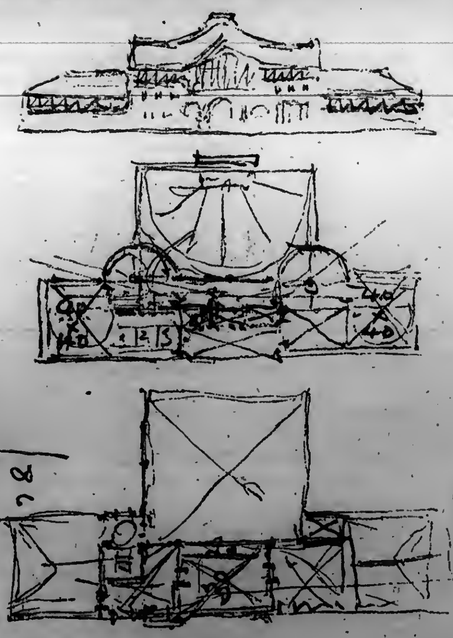
Mr. Willis Chipman, the well known civil engineer, left Toronto a few days ago on a visit to Europe, where he proposes to spend two months in the study of engineering works.

Mr. Philip C. Palen, formerly of Toronto, has recently opened an office for the practice of architecture in Collingwood, Ont., and would be pleased to receive from manufacturers and supply firms copies of their catalogues, etc.

The death is announced at Stratford, Ont., of Mr. Jos. G. Kirk, C.E., who was one of the oldest and best known members of the profession in Canada. The late Mr. Kirk was born in Londonderry, Ireland, in 1809, and came to Canada in 1829, and for some years thereafter practised at Ottawa.

We regret to chronicle the death, at the age of sixty-five years, of Mr. Duncan McIntosh, President of the McIntosh Marble and Granite Co., of Toronto. The deceased was a native of Perthshire, Scotland, had been engaged in business in Toronto since 1871, and as a citizen was highly esteemed.

Mr. W. E. Doran, the well-known architect of Montreal, is receiving the well deserved congratulations of his friends in and out of the profession, on his splendid run for the mayoralty. Without the aid of the usual election machinery he secured the support of 8,492 electors. In his election address he said: "I would use my influence in regard to enforcing the by-laws on sanitation, and to bettering the sanitary condition of the city. For a long time the aldermen have pigeon-holed a proposed by-law that would make much improvement in the conveniences of houses erected in the city; this is a great shame, especially to the masses who cannot afford to build houses and put sanitary arrangements in them which they would like. A mayor who had the interests of the city at heart would not permit of important by-laws being pigeon-holed in any such manner; he could keep calling meetings till action would be taken upon them."



LAW SCHOOL.
(Autograph Sketches by H. H. Richardson.)

C pyright 1893. HORTICULTURE AND FORESTRY BUILDING—PAN-AMERICAN EXPOSITION.

SHORT FORMULAE FOR ARCHITECTS.

BY GEORGE H. BLAGROVE.

THE scientific formulæ in use for calculating the conditions of structural strength in buildings are generally found too complex to be worked out at short notice. It is now proposed to mention a few short rules, which easily remembered, which involve only such simple calculations as are readily performed, and which will give sufficiently accurate results for practical purposes. We have, of course, no wish to supersede the use of proper scientific formulæ, but only to furnish the architect with rules that can be applied in briefly examining structural conditions when on the works, in drawing out preliminary sketches, or in any circumstances under which elaborate calculations are hardly practicable.

One rule of the kind to which we refer is Brown's formula for finding the horizontal thrust of a segmental arch. The radius of the arch, multiplied by the thickness at the crown, and by the weight of the masonry in hundred-weights per cubic foot, gives the thrust in hundredweights, the arch being presumably 1ft. thick. After a comparison of results, it may be mentioned that this formula is so nearly true for flat segmental arches as to dispense with the necessity for any other calculations.

The resistance of a retaining wall depends upon the distance of the centre of gravity of its section from the fulcrum, or point upon which it would turn if it were overthrown. Hence, if the wall be build to an incline or batter, it need not be so thick as if built vertical. In Molesworth's "Pocket-Book of Engineering Formulæ" is a table of calculated proportions for the thickness of retaining walls. But the figures cannot well be carried in the memory, and the following rule will serve as a safe guide for walls of masonry about 27 per cent. heavier than the earth behind them: take one-third of the height and subtract from it the total amount of batter; the remainder is the thickness of the wall at the top. Thus a wall 9 ft. high, with a batter of 1 in 6, must be 18 in. thick at the top. The thickness will increase by regular offsets to the base, where it will be about one-third of the height.

Some of the most elaborate formulæ have been devised for calculating the strength of iron columns and stanchions. For cast-iron columns; solid or hollow, circular or square, the following rough rule will give approximately true results; substract the number of diameters in the height from 40; the remainder is the crushing strength in tons per sectional square inch. Thus, at 30 diameters high, the strength is 10 tons, and the safe load one ton, per sectional square inch.

For built columns of mild steel, divide 400 by the number of diameters in the height, and the quotient will give the crushing strength in tons per sectional square inch. For wrought iron, take three-fourths of the above result. This rule applies to columns over 20 diameters high.

By the ordinary formulæ for girders, the strength varies directly as the depth and the flange area, and inversely as the span. In rolled joists, it is evident that the flange area bears a pretty constant ratio to the weight per foot run. Hence, for rolled joists of mild steel, we have the following rule: multiply the depth in inches by the weight in pounds per foot run, and divide by twice the span in feet; the result gives the safe distributed load in tons, three-fourths of which will be applicable in the case of rolled iron. But when a constant ratio is preserved between the depth and the span, it is evident that the safe load will bear a constant ratio to the weight of the joist per foot run. Suppose, for example, that we agree to have the depth of a rolled joist one-twenty-fourth of the span, then for rolled steel one-fourth of the weight in pounds per foot run will be the safe distributed load in tons, three-fourths of which will apply in the case of wrought iron.

The following is an instance of what might occur in working out a warehouse floor constructed with rolled-steel joists. The span is 12 ft., and the load four tons. The depth must he one-twenty-fourth of the span, and the joists must therefore weigh 4 x 4 = 16 lb. per foot, and be 6 in. deep. In a manufacturer's list we find steel joists 6 in. x 3 in., 16 lb. per foot. Could the result have been attained more quickly? Applying a similar principle to a cast-iron girder of Hodgkinson's pattern, of which the depth is to be one-sixteenth of the span, we double the safe distributed load in tons to obtain the area of the tension flange in square inches. For a riveted steel girder of the same proportionate depth we could take one-seventh of the above result or about one-fifth for wrought iron.

If we wish to find the approximate strength of a fir post, we divide 15 by the number of diameters in the height, and the quotient is the crushing strength in tons per sectional square inch. Double this, and we have the safe load in hundredweights per sectional square inch. With fir beams, the sectional area, multiplied by the depth in inches and divided by the span in feet, gives the safe distributed load in hundredweights, taken at one-fifth of the breaking weight. This rather high safety factor would enable us to make the depth about one-twentieth of the span. Here again, if we adopt a fixed ratio of depth to span, we can simplify the calculation. If, for example, we agree to make the depth one-twentieth of the span, we can take three-quarters of the sectional area in inches for the safe distributed load in hundredweights.

Many rules in use for finding the scantlings of roof and floor timbers are not founded upon scientific principles, although they give results which may be safely followed in practice. Thus, for the depth of floor joists, in inches, add 2 to half the span in feet. For trimming joists, add ¾in. in breadth for each joist supported by the trimmer. For common rafters, add 1 o the bearing, in feet, and take half the sum, for the depth in inches. For purlins, when the trusses are 10 ft. apart, add 3 to the depth of the common rafter, for the depth of the purlin, and make its breadth about three-fifths of its depth. For the tie-beam take one-third of the span in feet and add 2 to the depth in inches, making the breadth about half the depth. Make the depth of the principal two-thirds of the depth of the tie-beam, and its breadth about four-fifths of its depth.

Rules of the kind quoted could not be formulated for iron roofs, because the nature of the material requires closer accuracy in computing its section.

ILLUSTRATIONS.

OFFICES OF THE IMPERIAL BANK, SUN LIFE ASSURANCE COMPANY'S BUILDING, HAMILTON, ONT.—WM. AND WALTER STEWART, ARCHITECTS.

BRONZE GRIFFIN AND ELECTRIC FIXTURE, AT FOOT OF MAIN STAIRWAY, SUN LIFE ASSURANCE COMPANY'S BUILDING, HAMILTON, ONT.—EXECUTED BY MESSRS. CHADWICK BROS., HAMILTON—MESSRS. WM. AND WALTER STEWART, ARCHITECTS.

COMPETITIVE DESIGN FOR METHODIST CHURCH, VANCOUVER, B.C.—ARNOTT WOODROOFE, ARCHITECT.

THE GRANGE, TORONTO.

SUN LIFE ASSURANCE CO. OF CANADA — HAMILTON BRANCH—WM. AND WALTER STEWART, ARCHITECTS.

This building has been erected on the site of the old post office building, James street north, the old foundation walls being used to a great extent. The old part was faced with Amherst freestone, and this was all re-used in the new front after being re-dressed.

The interior of the building has been finished in a very elaborate manner. The wood-work throughout is of quarter cut golden oak, supplied and erected by J. Hoodless & Son, of Hamilton.

The halls are finished in Numidian marble, with dado panels of Mexican onyx. The staircase is of Tennessee marble, with an ornamental dull brass railing, and the floors throughout are of marble mosaic.

The Forsyth Marble & Granite Co., of Montreal, were the contractors for the marble work.

The ceilings are of ornamental staff finished with a wiped effect, and were modelled and supplied by W. J. Hynes, of Toronto.

ARTS AND CRAFTS EXHIBITION.

The Ontario Society of Artists announce an exhibition of applied art to be held at their galleries 165 King st. west, Toronto, during the month of April, 1900.

This being the first exhibition of this nature to be held in Toronto, the committee of arrangements have deemed it advisable to make the following statement of the objects to be attained and to make an appeal to intending exhibitors for a high standard of excellence in the work.

"As it is the intention to hold the exhibition in the art galleries the space will be limited, and accordingly exhibits are being solicited from Toronto designers and manufacturers only; it is not to be a strict rule, however, that only Toronto exhibits shall be eligible.

"The scope of the exhibition will not be limited in any way, merit of design and workmanship making any object eligible. All works exhibited shall have the name of the designer, and such workmen as contribute artistic value to them mentioned in the catalogue, together with manufacturers' and owners' names.

"The committee of arrangement will seek to conduct the exhibition so that it will be an artistic success, and as this will be secured only by good work being shown they reserve the right for committees of selection to select from the work offered that which they deem of highest quality. The members of the committee of selection will be chosen with a view to obtaining the best judgment possible.

"All drawings should be framed, if ever so simply, and in cases where the executed work is of such nature that it would be impossible to exhibit it, the design may be accompanied by a photograph; unexecuted designs may also be exhibited.

"Designers have entire freedom as to the form in which they may show designs, either by drawings, models or the actual works, but it is expected that some notion of the completed article or thing will be given, and not merely working drawings, which, useful and appropriate in their place, are unsuitable in an exhibition."

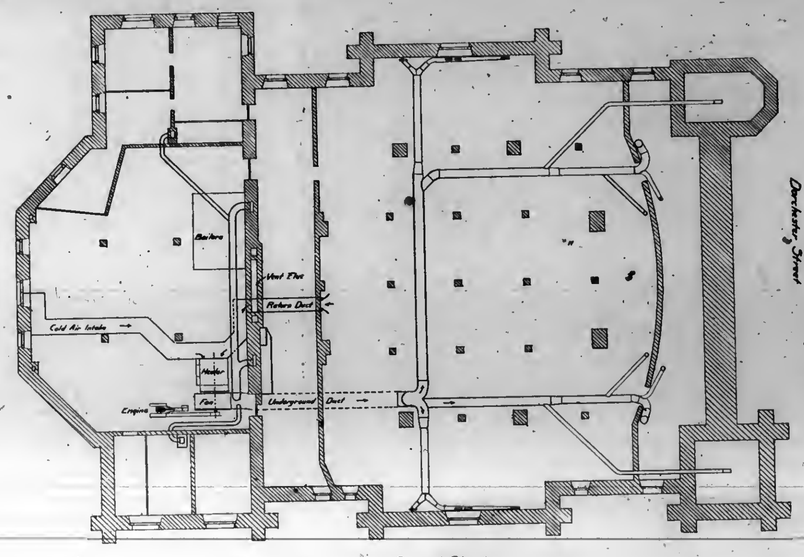
All communications regarding this exhibition should be addressed to Mr. Robt. F. Gagen, secretary, 90 Yonge street, Toronto.

A METHOD OF HEATING AND VENTILATING CHURCHES.

So little attention is, as a rule, paid to ventilation in our churches and public halls, that we are always glad to notice any successful attempts at a solution of the problem. That it would be a great boon to the public, all acknowledge ; practical experience however, often makes one fear that its realization cannot be looked for at present.

One of the latest attempts in this direction is to be found at the Crescent Street Church (Pres.) of Montreal, where a complete hot blast or fan system of heating and ventilation has been installed during the past season.

We give a sketch plan to shew location of plant, conveying pipes, &c. The church is a large one, containing some 385,000 feet in the main audience room, and about 128,000 feet in the lecture and Sunday school rooms, the latter situated in the extension, which has two storeys.



METHOD OF HEATING AND VENTILATING CHURCHES.

Entering the basement, we find the boilers, heating coil, fan and engine, located in the extension, and directly under the lecture room. As there is a heavy division wall between this and the main church, this arrangement brings all the machinery directly under the eye of the engineer, and at the same time secures quietness for the main audience room. We find here two boilers of 25 h.p. each, arranged to be used separately or in combination, and ordinarily run at about 60 lb. pressure. The heating coil, encased in a jacket of steel, contains 5,350 ft. of 1" steam pipe, and owing to the increased circulation by this system, is equal to about three times that amonnt when arranged in the ordinary way. The air ducts are so connected with the heater that air from the church, or fresh air from outside, can be drawn through it in any proportion desired.

The fan has a capacity at 300 r.p.m. of 24,000 c.f.m., and is capable of changing the entire air in the church every 15 minutes, but during the services is slowed down to about ⅔ speed. The engine is one made by the Laurie Engine Co., with cylinder 6"x 9", the exhaust steam going directly into the outside sections of the heating coil.

The fan, of the ¾ housing type, is set directly over a Portland cement duct, some 35 feet in length, before connecting with the galvanized iron piping. By this means much of the trouble from vibration is avoided, and a permanent connection secured. Branch pipes lead to the lecture room directly above, and the school rooms on second floor. The arrangement of piping for the church proper is shown on the plan, and it will be seen that the front porch and towers are provided with a moderate amount of heat, thus preventing extremely cold-draughts when the inner doors are opened.

Proceeding upstairs, we notice that the air enters the body of the church at twelve points, only two of which are at the floor level and these almost directly in front of the doors into the vestibule. Two openings with diffusers are placed just under the gallery at the front corners, and one large register each side of the pulpit and some 30 ft. from the floor. The special feature of the plan, however, is the provision for a curtain of hot air 4" thick in front of the large windows at each side, and the front of the church. With the old furnaces, great trouble was experienced with currents of cold air from these windows that could be felt even to the centre seats, but the new plan has proved a great success. This method has not disfigured the windows, and it will take a close examination to discover how the air is admitted.

Passing on into the extension, we find the registers so arranged as to blow the air against the outside walls above the heads of the audience, with the return flow along the floor. In the main church the registers formerly used for the furnaces have been utilized for returning the foul air to the ventilating flue.

The plan of operation generally followed is, that while the church is being heated, the air is returned continually through the heater, it being perfectly fresh and pure. This is continued until just before the audience assemble, when the dampers are changed, fresh air from outside brought in, and the return air sent directly into the ventilating flues.

Perhaps a few facts as to results will be of interest. A short time ago the mercury on Saturday marked 5° below zero, with a high wind blowing. Steam was raised after dinner, and the fan started at 2.15, the temperature in the building being 25°. At 3 o'clock, or forty-five minutes later the mercury had risen to 58°. The heat was kept on until about 10 o'clock that evening, when fires were banked and left until next morning, when a two hours run raised the glass to 72°, and the speed was reduced. Under ordinary circumstances the school room is left until the close of the morning service, as a two hours run is sufficient to bring it to any desired temperature.

From present appearances it looks as if this plant should be placed in the front rank of modern heating and ventilating outfits, and it reflects great credit upon the contractors, Messrs. Geo. W. Reed & Co., of Montreal.

BY THE WAY.

A four years course in landscape gardening has recently been established at Harvard University. It will include the study of architecture, the artistic treatment of natural forms, practical horticulture and aboriculture.

× × ×

The City Solicitor of Toronto has stated that the City Council have power to appoint an inspector of elevators, under sub-section 6 of section 541 of the Municipal Act. He suggests the importance of also passing by-laws to regulate the construction and use of elevators.

× × ×

The Ontario Society of Artists have selected for the Ontario Government the following paintings by Ontario artists to be placed in the halls of the Legislative buildings at Toronto : T. M. Martin's "Blue Grouse" ; R. F. Gagen's "The Vanguard of the Coast" ; C. M. Manly's "The Valley of the Teigh" ; F. S. Challeners' "A Fisherman's Home," and W. A. Sherwood's "The Morning Paper."

× × ×

The Assessment Commissioner reports that the number of vacant houses and stores in Toronto is less than one-half the number recorded a year ago. During 1899 there were erected factory buildings valued at $1,000,000, dwellings valued at $800,000 in addition to repairs and alterations costing $300,000. This is a good showing.

× × ×

The measure which is now before the Dominion Parliament providing for government regulation of the sanitary conditions surrounding workmen employed on railways and other public works ought to have the support of members on both sides of the House. This measure may be regarded as the result of the recent disclosures concerning the conditions attending the construction of the Crows Nest Pass Railway.

× × ×

Considerable interest will be taken in the doings of the Commission to whom has been entrusted the expenditure of the grant of $60,000 per year by the Dominion government for public improvements at Ottawa. The first step has just been taken in determining to establish a number of handsome boulevards. King street, from North of Rideau street, to the river, is to be improved in this manner. The beauty of Nepean Point will, I fear, be seriously marred by the excavations now being made for the railroad roadbed connecting with the Interprovincial Bridge which is to span the Ottawa river at this point.

STUDENTS' DEPARTMENT.

CANADIAN ARCHITECT AND BUILDER STUDENTS' COMPETITION.

SEVEN sets of drawings have been received in the CANADIAN ARCHITECT & BUILDER'S STUDENTS' COMPETITION for a Suburban Bicycle Club House. These drawings are now in the hands of the Committees of Award appointed by the O. A. A. and the P. Q. A. A. At the time of going to press the report of the judges had not come to hand ; but it will appear in our March number.

PLANNING A STABLE.

IN considering a few main points in stable planning, says a writer in the National Builder, the thing of most importance would seem to be that a stable should be planned with respect to the points of the compass, the same as a house and for the same reasons. Sensible people like to live on the sunny side of the house. Horses and cows like it as well, and it is positively cruel to animals to locate the stalls on any other side but the south, for it is always possible to do this much. How careful some persons are about selecting a site for the house where it will be dry and sunny, and why should they not be just as careful about selecting a site for a barn? Badly constructed stables are never economical, and in many cases a little extra money spent on them will repay itself in the better condition of the animals that have to inhabit them. I have always held that a barn poorly ventilated will cause the loss of more money in a few years, by the poor health of animals, than it would cost to build a dozen ventilators. I have not built a single stable for the past fifteen years without putting in one or two ventilators. There should be a ventilator from the stable, and where possible, one also from the hay loft. The best way to arrange the stable ventilator is to inclose the shaft from the loft door up to the roof outlet. I am at work at the present time on a stable in which I am placing two ventilators. In this stable I have built the ventilators from the loft floor up to the roof, with an opening into the shaft from the loft by means of a door about four feet from the floor, which, when opened, will afford loft ventilation as well as stable. Under the shaft I will place in the loft floor a trap door on hinges. In the floor I am using 2 inch matched yellow pine. Under the stalls the beams will be blocked for a fall of 2 inches to gutter, and a ⅞-inch matched floor laid. This I intend to have covered with coal tar and lay oak strips cut from 4x4 timber, by one sawing to make two pieces 3x4 at one end and 1x4 at the other. These strips I will lay about ⅜ of an inch apart, with the 3-inch end towards the gutter, so that the horses will stand on a level space. By this method the stall floor will be elevated 2 inches above the stable floor ; the gutter is sunk so that its top is only 1 inch above the beams. This gutter will lead to a manure pit, which will be located convenient to the stable door, and be constructed water tight. The stall partitions are to be made of 2-inch plank let into the grooves cut in the stall posts. The partitions will be 5 feet high, with iron guard to keep the horses from annoying one another. There are many more points that ought to be given in this letter, as I have not covered half the ground I intended when I started out ; but I am making this too long, so will close and give the rest some other time.

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COLOR IN ARCHITECTURE.*

By John Gemmell.

When our Registrar suggested that I should give a paper on color in building materials at this Convention, there ran through my mind some random readings I had done in chromatics. My first thought was to attempt with the aid of books a learned inquiry into the theory of light and color, and the laws which produce harmony or the reverse, and applying these to the prevalent building materials, get some idea which to combine and what to reject. On second thoughts, however, it seemed to me that an architect was more in the position of an artist, with perhaps his pigments more limited.

Much as the world owes to the patient labors of science, it may well be doubted if these are of help in the domain of art which has to do with the external appearance of things earthly.

Great artists were great colorists from intimate study of nature seen by the naked eye. Indeed, is it not probable that the artistic sense of form may be coarsened by the deeper insight of the anatomist about the framework on which is hung the beauty of a "Venus" or an "Appolo"? I can well believe that Raphael knew less anatomy than Michael Angelo.

Beauty of form in objects, blending and contrasting of color in an autumn landscape or the glory of a setting sun, are appreciated by the artistic temperament perhaps much more intensely than by the learned philosopher discoursing by his side on the complete mathematical precision and proportion of the wave theory of color. It is not to belittle this trend of our time to attain to the Genesis of all things, but to make the claim that the highest skill in arrangement and disposition of color in art is quite possible with no other guides than observation and God-given instincts, which are above rule, and that appreciation of color may in no way be enhanced by a knowledge of the laws of chromatics. If the artist is faithful to catch the changing face of his mistress, Nature, this will be to him a royal road to perspective, color and other sciences.

But what, say you, has the architect to do in common with the landscape painter? Are not his aspirations very much curbed by the limitations of his materials? True! yet is it not most essential that he should have as much as possible of the artist's eye for the beauty in nature, that his work may not prove the discordant note in its surroundings? He it is who rears that which marks the advent of the living and receptive soul on the scene, and it surely were a great pity if his building became a blot and excrescence—spoiling a spot that it may be dear to many—when by more feeling for and study of his site, it might have become the one thing that was necessary. How often have we seen vulgar ostentation think it has achieved fame by painting a whole house in colors that nature uses for her smallest flowers!—brilliant red brick, lilacs, olives, blues and yellows! You remember how the Americans were emulated in their use, speaking of the Canada drab with much scorn. Which of you now, granting your house were good architecturally, would not rather paint it drab than say, pea green? For a country house, therefore, where the beauties of Nature are the chief attraction, and means very rarely forthcoming to build a stone or marble mansion to dominate the scene, the best solution of the color problem is to make the house subordinate and a complement to the landscape. If brick is used, let the mortar joint be honest and very perceptible to tone down the color in mass. But perhaps the best mode of construction for such a building is the entirely shingled house, the staining of which affords facility in carrying out color schemes that with difficulty can be made vulgar.

It is in the cities and towns, however, that unbridled liberty in the use of various colored building material and coloring of buildings is likely to render any broad and harmonious whole impossible. What should be the prevailing color of a city seen as a whole approached from the water front or from points of vantage in the surrounding landscape, and which architects should, by their individual efforts, endeavor to control?

I may as well here state that in my opinion the palette prescribed by good taste, at least for the exterior of buildings is extremely limited, and that the building material used on this continent has been generally of too positive a color, and it would have been vastly better if no material darker than Ohio stone (which is about the darkest of natural stones) had been used. I think I am justified in saying this, as it is now being found out that the varieties of brown stones are or perhaps should be soiled and spoiled products of nature, taking their color from oxidation of iron, and this oxidation going on more rapidly when exposed to the air, destroys the stone in less than a generation. There is now arisen a craft in New York depending on its skill in restoring lost angles, moldings, etc., to brown stone buildings not thirty years old yet, in a state of decay.

Architecture is a plastic art, concerning itself with outline, light and shade more than color, is akin to sculpture more than painting. Now just think how all the beauty of a piece of marble sculpture would be lost if reproduced in commercial brown stone. If Lily Langtry or others of the world's beauties, with all their perfection of feature, were of Ethiopian complexion, would we still see their loveliness?

Does not nature suggest in the large and clumsily modeled features of the negro that the material was unpromising and fitted for nothing better than a charcoal sketch of humanity? The only virtue I could see lately in the once vaunted brown stone fronts of New York was that this color to a large extent obscures the wretched bad detail of their period, and now when a great deal of their architecture is following better and purer models, New York has for building materials pinned its faith to Bedford limestone, a light grey Buff brick and a brick almost white with a black speck running through it, giving texture. As a result I assure you that city has taken on a smiling look which was not there a few years ago, even from the harbor, but especially in the direction of the river drive, which is the hope of New York, where is to be seen their best in architecture—Columbia College, St. Luke's Hospital and other buildings whose authors with their increased knowledge of true architecture seem to believe also that this is best embodied in materials of light color. In Washington, viewed as a whole, we have perhaps the best example of a beautiful city on this continent and the only one I know of that has a just arrangement of buildings in order of their importance. The capital on a hill dominates the whole, the minor buildings of government surrounding, and all built with some dignity, and best of all, none of the dwellings or mercantile buildings are of that exceeding size which renders a harmonious whole impossible in other American cities, and makes all attempt at temple or public monument futile. The capital library, Washington monument, and the city generally is of light colored material with more than one dome in gold.

To uphold my contention that good architecture should never be clothed in dark materials perhaps it is better to go back to the ancients for the color as we had to for the forms. I do not think they used dark stone. When we conjure up the classic buildings of Greece and Rome, it is I think, of a gray hue we imagine them

* Paper presented at the annual convention of the Ontario Association of Architects, Toronto, January, 1900.

—perhaps because our best reproductions of them are of this hue—yet you know the Elgin marbles which formed the Tympanum of the Parthenon's pediment are of that ivory yellow which white marble takes on by lapse of time, and the whole building was no doubt of the same material. Wander among the ruins of that centre of the world's civilization, the Forum of ancient Rome, and we can no longer speak of them as cold grey stones. If I remember rightly the pavements, steps, pedestals and bases were of white marble, and by the remains of broken shaft, capitals and cornice the superstructures had been of the many colored marbles of Italy. Recalling your knowledge of Roman costume—the togas of red purple and fine linen—you must imagine a much more glowing picture of ancient Rome than its distance from us is apt to call up. May we not then from the fragments left us conclude that the ancient classic art so true and beautiful in form, believed that this form was best displayed by materials of lightest shade of color. This, if true then, is true to-day. Perhaps Paris the beautiful is so more from the use of the light Caen stone than from its architecture, which is somewhat flat, and certainly monotonously alike.

There is one little town that lives in my memory—often called up, though I never knew its name—but which I think was an object lesson in color. My train stopped for about five minutes on the Italian side of the Alps; about half a mile from the tracks there lay a lovely placid blue lake; on the other side of this, with its reflection in the water, built up the mountain side, appeared a small town, the walls of yellowed white stucco, projecting eaves of the roofs, deeply revelled windows, open inviting galleries and many a natural addition of gable and lean-to; all the walls were one color—all the roofs of low Italian pitch and red tiled with that half round tile that makes so exceptionally fine finish at the eaves; the spaces were made up either by the grey tone of the roadways or the green of the vines or trees. Illumined by the morning sun of a spring day one could trace the soft green foliage up the mountain till it merged into the glittering white and blue peaks of eternal snow which crested the scene, against the deepest of blue sky.

I cannot help thinking how much of the brilliancy the whole would have lost if the houses of that mountain village had had walls of dark brick and its roofs had been dark slate. In passing, is it not aggravating that so complete light and durable a roof as our Canadian slate, gives so little satisfaction in point of color with its staring unchanging black.

Getting nearer home in this matter of color in architecture, some of us remember the advent of red brick inculcated by the lectures of Oscar Wilde and the example of our continental neighbors, who more than once have had a malign influence on our tasks when we were following the traditions of the old country—our legitimate inheritance—leading us astray into abominable practices of galvanized iron, clapboard and the like, and later the worship of the prison-like Romanesque, a style which can only now be admired in a few of the works of the leader of that movement, and these more as the energetic struggles of a vigorous mind shaking itself free from a very chaos of debased architecture.

But I am degressing. The red brick period came and to a large extent is with us yet. It was hailed as a Renaissance in our architecture, and we out-Heroded Herod, making our walls a mass of red with no evidence of construction, obliterating the mortar joint, which is not honest. Properly laid walls with mortar joint large enough to bed and point the brickwork properly, result in a very different tone of color in mass.

Has then color to be entirely eschewed on the exterior of buildings? No, but I hold that color is somewhat as Tallyrand said of speech, that it was a gift given to enable man to conceal his thoughts. In true architecture the massing and outline should attract, but also its details should hold and give study to the eye. Now is it not true that in a building of dark stone or brick one is conscious of its color above everything else? Has it not about the same relation compared to a light building that a silhouette holds to a portrait—striking outline at the expense of expression and detail?

This use of dark colors for building allows no field for that mellowing and blending effect of time to do its best work. Look at the stone work of St. Andrew's Church or that of the University, and you will see what is meant, and I think you will also be convinced that these effects are never produced with a groundwork of dark stone; and the same can be said of the inferior material, brick. I believe from the weathering qualities of some examples of our old Yorkville white brick, that had we been less of faddists and persistently improved our architecture in that material, we would now be further advanced in the direction of good architecture in individual buildings, and the general effect immensely better.

I have frequently noticed the east end of Holy Trinity Church—it is a delightful specimen of old white brickwork which time has only ripened and not much injured. The firm of Darling & Curry some time ago erected a school house to this church, and wrongly, I think, following the fashion of the times, it is of red brick. I would like you to compare the two, and without saying anything in disparagement of its architecture, I believe we would all agree that there is no hope that the school house walls will ever acquire the interest of those of the older building.

With the glamour of red pressed brick, brown stone, brilliant stained glass and the like, we will never gain the repose and dignity of great or even good architecture. Color does to a certain extent attract the senses, but in the artificial surroundings of the interior of buildidgs will be foudn its more congenial sphere. On the exterior it is more a substitute for than an essential in architecture—whereby we can say "be ye warmed and filled," and yet refrain from giving thought, research and patient working up of details necessary to give permanent interest to any building.

Is it then my contention that the buildings of a city should be one uniform color? Perhaps this would flavour too much of dogma to suit the artistic mind, yet worse things could happen. I have instanced Paris and Washington, and might refer to the clean light granite cities of the north of Scotland—Aberdeen and its neighborhood—as being peculiarly satisfactory to all who have visited them, and certainly much more satisfactory in point of general effect to, say, that dreary monotony of red brick to be seen in a Philadelphia street.

I would remind you that Nature never indulges in chequer-board work. Broadly speaking, varying greens for the earth, grey for her cliffs and rocks, blue for water and sky—her efforts are gained by infinite gradations of these, with the aid of sunshine and shade, but how seldom and in what small quantities are the bits of color the artist speaks introduced, like accents in music. What extenuation, then, have streets to be seen whose buildings alternate in color like Joseph's coat?

There is none of you now would revive that style of building which, from its regular disposition of red brick and white stone, gained the cognomen of streaky bacon, and you are right in this, for nothing more certainly destroys the unity of a design than separating the cornice from its frieze, the architrave from its pillars, and otherwise breaking into fragments, by strong contrasts of color, that which should be viewed as a whole. Now, if the separate building has gained by this grasp of the necessity of unity in a building before it is to be considered worthy of criticism, why not apply the principle to the whole street or the whole city? To me it seems if this could be accomplished, there would be enough of color element introduced by the discolorations of time, by minor bits of detail, and the drapings of windows, which would suggest to the outside the warmth and hospitality of the interior.

As a last illustration to enforce the argument that materials of light shades of neutral color are best adapted for the building of an ideal city, I would ask you to look at the picture of old Venice on the wall to your left. Let us imagine that the government of that sea-girt city, attracted by the fame of a certain architect—one Signor Waite, of Palermo—they had on his advice at great expense changed the material of that beautiful church across the Lagoon, "St. Maria del Salute," and it was constructed of a sombre brown stone. Do you not think as you look at the picture that this would have been a frightful mistake, and the artistic sense of the Venetians would have been bitterly regretting it these many centuries?

The formation of a local Master Plumbers' Association at Victoria, B.C., is reported. Messrs. Barr and Rose, of Vancouver, assisted in its organization.

The creation of a prestige in business is sometimes the result of small things. We know of a plumber who distanced all his rivals by furnishing his workmen every morning when they went out of his store with clean overalls and jumpers. He provided these himself and kept them clean, and he found it to be the cheapest and most effective advertising, because all the housewives appreciated it so much that they told all their friends, and everybody in their immediate neighborhood sent for this particular plumber when they needed a plumber.—Advertising Experience.

THE BUILDER

[THIS DEPARTMENT IS DESIGNED TO FURNISH INFORMATION SUITED TO THE REQUIREMENTS OF THE BUILDING TRADES. READERS ARE INVITED TO ASSIST IN MAKING IT AS HELPFUL AS POSSIBLE BY CONTRIBUTING OF THEIR EXPERIENCE, AND BY ASKING FOR PARTICULAR INFORMATION WHICH THEY MAY AT ANY TIME REQUIRE.]

REGARDING STAIRS.

A good house," says Ware in his "Complete Body of Architecture," "should always have two staircases, one for show and the use of company, and the other for the domestics. This latter should be thrown behind, but the other is to be shown, and upon the proper placing of it depends in a great measure the judicious disposition of the rest of the house."

This quotation, of course, refers to houses of the better sort, and carries weight when so applied, but, unfortunately, our social conditions are so cast that the greater mass of humanity is compelled to live in houses where one flight of stairs has to perform the double service referred to above; and this condition renders it necessary to make the single flight as efficient and easy-going as possible, and to this end the following suggestions are offered.

In planning a building it is usual to place the stairs as near the main entrance as may be, a practice that is not always to be recommended, as the domestics, who are obliged to use the stairs daily, are generally farther away from the main entrance than the family, and therefore compelled to perform a great deal of useless and wasteful labor, and the treads from frequent use, soon become shabby looking and care-worn, and it covered, the carpet soon exhibits signs of wearings and decay. For a private house where only one flight is indulged in, it should be placed somewhere near the centre of the building and be accessible from any part with the least outlay of travel. This may easily be accomplished, and the stairs may be constructed between two walls, thus saving hall room below, and, where possible, the entrance might be covered with a door, to prevent heat from escaping from below, thus economizing in fuel, a matter of considerable importance in this country.

Stairs of this sort may be very cheaply constructed, as they will be closed in on both sides, and only a single rail, void of balusters, will be required. Where it can be done, it will always be wise to break the stairs about half-way up, by placing a landing or "rest," at least three feet square—more if it can be done. When occasion requires, the stairs may start from this landing in any direction; they may go forward, turn to the right or to the left, or return on the direction of the first flight. If the latter method is adopted, the landing must be at least twice the length of step, in order to accommodate the last step of the first flight, and the first step of the second flight.

These suggestions hold good for the back stairs when two or more flights rise from one floor, but in all cases care should be taken that the stairs intended for the domestics be easy to travel and as free from turns as possible, and sufficiently wide to allow of two persons passing each other without being cramped or crushed. The custom of crowding the stairs into any out-of-the-way corner, and twisting them like a corkscrew, is wrong and inhuman, and has much to answer for.

With regard to the main stair in a fairly equipped house, the circular model should be avoided, for, while a grand stair or a circular or elliptical plan, is "a thing of beauty," when generously treated, it is sadly out of place when introduced in an entrance hall not more than six or eight feet wide. Winders are always objectionable on a small scale, and should never be employed where a landing or "fliers" can be substituted, though, of course, the writer is well aware that there are cases where winders are a necessity, but in a majority of cases they may be dispensed with.

A very important matter in designing stairs is their proportionate disposition, so as to obtain the utmost facility of access to the various storeys with which they communicate without a wasteful sacrifice of either space or material.

It may be well perhaps to notice two or three general considerations applying to all cases of good stairs and stairways. These are:

First, that every stair should have sufficient headway to allow a tall man wearing a tall hat to pass easily, and this may be put down at about 7 ft. 6 in., between the trimmer at the well-hole and the head directly under it. If there is any difficulty about this, the trimmer should be made to suit.

Second, no stairs should be less that 2 ft. 6 in. wide, even back stairs from the kitchen should be at least 2 ft. 10 in. in width, and main hall stairs in private houses should measure not less than 3 ft. 4 in. from outside to outside of string. In public buildings, the least width permissible is 4 ft. 4 in.

The third element in the proper proportioning of stairs is the angle of ascent, which is necessarily dependent upon the dimensions of the rises and treads of the stairs. As this is a point of much importance in rendering a stairway easy of going, considerable attention has been given to it by practical stair-builders as well as by eminent architects, who together have evolved certain fixed rules from the relations subsisting between the height and width of steps. In this regard the same rules apply, with but little modification, to all stairs, of whatever material they may be made—wood, stone or iron.

It may be taken as a general maxim that the greater breadth allotted to the tread of the step the less should be the height of the riser; and that this is a common-sense view is evident from the consideration that, in walking up inclines or hills, we find that the steeper the ascent the shorter are our steps, or vice versa. Experience has shown that a step having a tread 12 in. in width and a riser 5½ in. high is convenient and well proportioned. Seventeen and a half inches then may be taken as a standard from which the dimensions of others may be deduced, so whatever may be the width of the tread, that sum should be supplemented with a sum—the height of the riser—so that the sums combined, will make a total of 17½ inches. Of course, this rule cannot always be followed, but it should be kept to as close as conditions will admit.

A very good way to determine the width of tread, or height of riser is by making a right-angled triangle a b c, as shown in the figure. Suppose a b equal to 24 inches, and b c equal to 11 inches, which makes the standard proportion of tread and rise; then to find the riser corresponding to a given tread, from b set off on a b the width of the tread as at b d, and through d draw the perpendicular d e, meeting the hypothenuse in e; then d e is the height of the riser, and if we join b e, the angle d b e is the slope of the ascent. In like manner, where b f is the width of the tread, f g is the riser, and b g the slope of the stair. The width of tread b h gives a riser of the height of h k, and a width of tread equal to b l gives a riser equal to l m; and b d gives a riser of d e; and so on, the tread governing the height of riser as shown,

Diagrams for Proportioning Stair Treads and Rises.

but, the rule may be reversed and the height of riser may be made to govern the width of tread.

Another system is to set down two rows of figures, each in arithmetical progression; the first set showing the width of treads, ascending by inches, and the other showing the height of riser, descending by half inches. It will readily be seen that each of these steps and risers are such as may suitably pair together.

As before stated, it is very seldom that a hard and fast rule will apply to the proportioning of stairs, so all that can be done in the matter is to offer a standard, which it is desirable to approximate.

Treads, Inches	Risers, Inches
5	9
6	8½
7	8
8	7½
9	7
10	6½
11	6
12	5½
13	5
14	4½
15	4
16	3½
17	3
18	2½

In better class buildings the number of treads is considered in the plan, which it is the business of the architect to arrange, and in such cases the height between the top of the lower floor and the top of the next floor above is divided into as many parts, less one, as there are treads shown on the plan.

The method of construction of stairs is a matter of great importance, and will be discussed separately later on.

HOW TO CARRY A LONG GIRDER.

Thousands of tons of long girders to be used for bridges and for buildings are carried on our railways and roads every year. A very slight error or want of foresight in the handling of these girders during their carriage may severely damage them, and, in fact, it is quite possible to strain (the word being used in its proper sense of deformation) the flanges or web with rough or unskilled handling more seriously than the girders would be strained under their intended load. A girder laid on its side, when it is never intended or designed to be placed in such a position, may have its effective strength very easily deteriorated, and it is even possible that in some cases a permanent strain due to stress beyond the limit of elasticity may be forced into the girder whilst under handling, lifting, or transit.

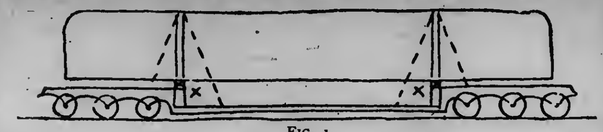

Fig. 1

The writer has seen long deep girders of very narrow flange, the very narrowness of the flange probably intended to be met in fixing the work by some cross-bracing or ties, very severely treated by temporarily resting the girders on supports at each end, their own weight alone whilst in this position deflecting the girder several inches, and then, added to this deflection due to their own weight, several men with loads may have walked along the web of the girder from end to end, every step swaying and bending the girder several more inches up and down. This kind of sideways stress was of course never anticipated by the designer of the iron-work, and should never have been allowed to occur.

Then there is the danger of careless handling and lifting when loading and unloading the girders on and off the vehicles carrying them, whether these be railway waggons or road trucks, from the makers' yard to the site of erection. The writer has known many instances of girderwork being much injured by this treatment, and in several cases, parts of work that should have traveled safely have had to be partially cut to pieces, certain parts heated and made good and straight, and then re-riveted into its position.

As a matter of fact, the loading and unloading of long heavy and (under certain conditions) unstable girders, is generally left to a foreman who possesses no knowledge of stresses or strains, and who probably does not know the difference between tension and compression, or shearing or torsion. Such a man may easily injure the girderwork with the powerful cranes or lifting appliances which are under his control. It is something analogous to a battery of artillery being placed in the charge of a corporal who has never been through a

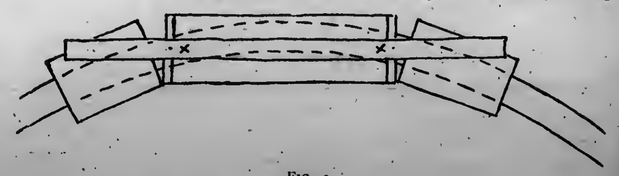

Fig. 2.

military school. He may do a great deal of harm in a very short time.

The writer once had a terrific struggle with one of this class, a "loading" foreman employed by one of the

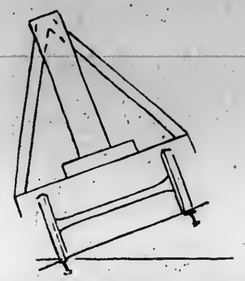

FIG. 3.

large railway companies. The foreman or "inspector" insisted that certain girders that had to travel several hundred miles should be loaded on their sides, whilst the writer equally insisted on the girders travelling in a vertical position, or in the position in which they had been designed to carry their own weight. In the end the foreman was defeated, but not before the writer had undertaken to take sole responsibility during transit.

METHOD OF CARRIAGE.

There are two methods of carriage of girders over railways. One is with fixed bearings such as the case when the girder is loaded on to a boiler-truck in which the frame and supports are rigid. (Fig. 1.)

In this case, the question must be considered whether

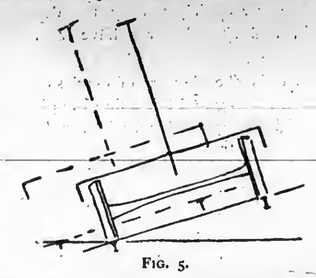

FIG. 5.

the girder is of requisite strength to act as a cantilever between the bearing and the end of the girder.

The next question to be thought out is whether the the height of the girder when loaded on the truck is sufficiently low for it to travel under the loading gauge of the different railway lines on which it may have to travel. In this connection the sharpest curve on the route must be known, because in the case of a sharp curve the loading gauge follows the curve, whilst the girder is straight and does not curve with the track. Plan Fig. 2 will show this.

It will be seen that the centre of the girder is to one side of the centre line of the rails, and the ends of the girder are to the other side of the centre line of the rails. This makes the virtual width of the load much more when travelling over curves.

The cant of the rails where curves occur is also worthy of consideration. In some cases of 4in. or 6in. cant or superelevation, the leaning over of the girder towards the low rail must be provided against by stiff struts of timber on the one side and efficient chains on the other side, and as the vehicle will have to go over curves both right hand and left, the struts and chains must be provided on both sides equally. A further consideration is the endways bumping of the vehicle when the train is suddenly stopped and started on the journey. This will occur at all stations and signals at which the train will stop, and may occur when the engine driver is descending a gradient and shuts off steam and applies his brake, or when the guard in his own van applies his brake. This endways bumping is to be met by chains fixed at an inclination to the vertical, and at both sides of the top of each strut. Fig. 3 shows the load when travelling over a curve with superelevated outer rail.

The second method of carrying over railways is with movable bearings or bolster waggons. It is not often that timber bolster waggons can be used for carrying girders as they are not sufficiently strong for very heavy loads; but sometimes special rail trolleys that are not in use at the time for transporting the long rails of our railway

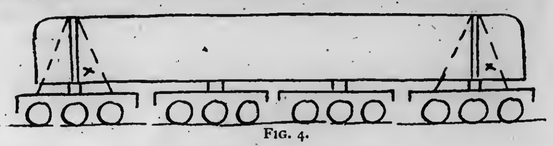

FIG. 4.

companies are used for the purpose of carrying very heavy girders (see Fig. 4.). In this case the same considerations of loading gauge, cant on rails, and the end shocks will have to be made; but the case becomes much more complicated.

It is well known that when felled trees are carried on bolster waggons, and firmly chained down to three or four of the waggons—the load being too long to be carried on ocly two bolster waggons—that, in such cases, the travelling of the combination will in such cases, either break the timber log, or, what is more probable, force the leading or trailing wheels off the road when passing over curves, and so derail the vehicles, or some of them. In this case the load is rigid, and the vehicle is movable with disastrous results.

If a load of timber logs should not be treated in this manner, much less should our girders be so dealt with. The result must be that either the stiff girder will force the vehicle off the road, or the vehicle when going around curves will damage the girder. But there is another reason why our girder must only be attached in two places to the vehicle, and why it should be well clear even to the extent of several inches from all other fastenings than the two referred to.

A railway track is a thing both of curves and also of

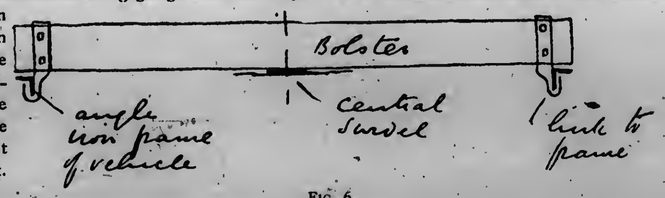

FIG. 6.

gradients. Whenever a change of gradient occurs, and the changes of inclination are many, either a salient or a re-entrant angle (in a vertical sense) has to be passed over. At a salient angle or angle greater than 180°, if the girder were resting on four points the load would be resting on the two inner points only with a tendency to

lift the two end vehicles off the road, and on the other hand, at a re-entrant angle or angle less than 180° the two end vehicles would be supporting the load, and the girder would be actually lifting the two inside vehicles off the road, and of course in this case the weight of the vehicles lifted off the rails would be added to the weight of the girders or the load carrying trucks, which would be overloaded and disaster ensue.

Further, there is the consideration of the three or four-truck vehicle when travelling over a curve with superelevated rail. Take a case of a rigid girder, when travelling on a four-truck vehicle, when passing over such a curve. It is assumed that the girder is supported and fastened at the two centre bolsters only, but that it is simply resting on the two end bolsters.

Fig. 5 will show the position, the full lines showing the inner vehicles, and the dotted lines the end vehicle. The centre lines are shown of both sets of vehicles, and as the center line of the girder is rigidly straight, it will be seen at once that the end vehicles will lift the ends of the girder, together with the inner vehicles, every time a curve with canted rails is passed over.

Further, there is yet the consideration that the connection of the bolster to the waggon is only at its centre or point of swivel, and at no other place. If the wind is taken into account together with a large cant in the rails, a considerable overturning tendency has to be dealt with. For this the sole connection at the swivel is not quite satisfactory, and some holding down link at the ends of the bolster should be made, at least in the case of very deep girders. The case of the usual load of rails on these trolleys need not be considered, as the rails are neither so rigid nor stacked so high as the girder on edge.

Fig. 6 gives an idea of such an attachment; of course the links or attachment should be made so that the bolster has full liberty to move sideways upon its bearings. Great care should be taken to oil or grease all parts that require it before the journey is made.—Building News.

LONDON BUILDERS' EXCHANGE.

The second annual dinner of the London Builders' Exchange, was held at the City Hotel, London, on the evening of the 7th inst. The occasion was marked by a large attendance, much enthusiasm and good fellowship. The newly elected president, Mr. Wm. Tytler, presided. Occupying places of honor beside him were his worship, Mayor Rumball, Colonel Holmes, Colonel Culver, United States Consul, Captain Robson, M. P. P. for East Middlesex, Colonel W. M. Gartshore, E.A. Roberts, secretary of the Cleveland Builders' Exchange, Wm. Jeffrey, ex-president of the local exchange, H.C. McBride and Thomas Jones. Among those present were noticed: W. Chamberlain, A. Stewart, W.P. Brown, J. Young, G. Craddock, W.T. Pace, L. Boss, C.H. Gould, J.S. Lunley, D. Ferguson, C. Ferguson, W.D. Willis, H. Edmonds, S. Willis, R.G. Wilson, I. Quick, R.H. Berry, C.T. Element, J. Adair, T.A. Parkinson, E. Fritzgerald, G.L. Gould, F. Martyn, J. Logan, J. Calhoun, A.M. Legg, R.H. Hessel, John Bryan, J.J. Foot, R.H. Pring, H. Sing, J. Sullivan, S. A. Thompson, J.H. Ryan, W.T. Hayman, A. Dowell, H. Hayman, J.W. McIntosh, J. Fenn, A. Irwin, G. Fox, C. Percy, Geo. Everette, R. Waide, W. B. Walker, D. J. Cowan, Geo. Buskard, H. C. Simpson, S.M. Stewart, T. Burnett, S. Stevely, J.A. Stewart, W.H. Angus, E. Kerrigan, J. Whittaker, T. R. Wright, F. D. Macfie, T.W. Copp, T. Gerry, J. Purdom, J. Burnett, R. Skelly, W. H. Winnett, G. Taylor, H. Stratfold, G. Howe J.W. Tucker, T. Robinson, T. A. Jones, T.R. Howard, George Mortimer, G.H.H. Platt, D.H. Gillies, A. Burnett, A. Nobbs, W.E. Tambling and G. Trambling. Regrets were read from Henry Martin, president of the Toronto Exchange; the president of the Cleveland Exchange; and John M. Moore, H. Matthews and F.H. Farncombe, of London.

In rising to propose the toast to Her Majesty the Queen the president expresses his pleasure at witnessing so large a turn out, not only of builders but of citizens in other walks of life. He referred also to the success which has attended the organization of the London Builders' Exchange and the benefits accruing therefrom. The new form of agreement which has been adopted has been found to be very satisfactory and present relations between the architects and contractors were of a cordial character. The year 1899 had been a fairly prosperous one for the building trade and the outlook for the present year was promising.

Following the singing of the National Anthem, Col. Culver, U. S. Consul, responded on behalf of "The president of the United States."

The toast to "The Legislative Assemblies" was coupled with the names of Capt. Robson, the newly elected member for East Middlesex.

Col. Holmes replied on behalf of the "Army and Navy" Col. Gartshore for "Our Boys at the Front" the Mayor for "Our City," Ald. Winnett for "Our Mercantile Interests" and Messrs. H.C. McBride and Geo. Craddock for the "Ontario Association of Architects."

After Messrs. S. Stevely, J. Burnett and J. Jones, had spoken briefly for the local Exchange, Mr. Roberts secretary of the Cleveland Builders' Exchange was called upon to respond to the toast to the "Sister Exchanges." In doing so he gave a very interesting account of the progress of their Exchange which numbers about 260 members and has an exchange hour every day from 11 to 12. Reports for the whole state of bids wanted, bids received, and the amount of the bid when it can be got are bulletined daily. Another feature they have lately introduced is a monthly dinner for the members of the Exchange and invited friends at which they make a point of having some interesting question relat-

MR. WILLIAM TYTLER,
President London Builders' Exchange.

ing to the building interests discussed in a vigorous manner and it has had the effect of bringing out some good debaters. He gave a very pressing invitation to the president and officers of the London Exchange to attend the banquet and ball of the Cleveland Exchange to be held on the 23rd inst., and said they were also anticipating with pleasure the return visit of the London Exchange to Cleveland in the summer. At intervals during the evening some capital songs were sung by Messrs. John W. McIntosh, H.R. McDonald, Captain Robson, M.P.P., H. C. Simpson, and Harry Stratfold. Mr. D. Murray also gave a violin selection which was well received.

The gathering dispersed at midnight, having spent a most enjoyable evening.

MR. WILLIAM TYTLER.

The subject of the accompanying portrait, Mr. William Tytler, of London, Ont., has just been elected president of the Builders' Exchange of that city. Mr. Tytler is a native of Aberdeen, Scotland, where he served his apprenticeship and gained a thorough knowledge of his trade. Some years ago he came to Canada and commenced business as a contractor in London, where he has established for himself an excellent reputation for good workmanship and upright dealing. The London Builders' Exchange have wisely recognized his abilities, and will benefit by his services in his present capacity as president of the Exchange.

CORRESPONDENCE.

DESIGN OF KIOSKS ON DUFFERIN TERRACE, QUEBEC.

To the Editor of the CANADIAN ARCHITECT AND BUILDER:

SIR,—Having in the past and lately again been several times asked by architects and others from the Maritime provinces and elsewhere for plans of the kiosks designed by me, now some 20 years ago, and since erected, five in number, along the 1500 feet

KIOSKS ON DUFFERIN TERRACE, QUEBEC.

frontage of Dufferin terrace, Quebec, it has occurred to me to have one of them photographed, and if reproduced in your paper it will thus reach the world over.

Our band stands are structures of the same design mounted on a substructure or basement of a height sufficient to answer as a resting place for the bandsmen to enjoy their smoke and glass of beer.

The kiosk proper is of cast and wrought iron, 20 feet in diameter, while the roof, for protection against sun and rain, extends to some 30 feet, or 5 feet further all around. The roof, little of which is seen in the photo, is of an ogee or of double curved profile reducing to a straight slope over its salient portion.

CHAS. BAILLARGE,
Architect and Engineer.

QUEBEC, February 29, 1900.

SOME NOVEL ARCHITECTURAL FEATURES.

To the Editor of the CANADIAN ARCHITECT AND BUILDER:

SIR,—As spring will again soon be to hand when ladies will be anxious to give their wintered flowers an airing your readers will perhaps be interested in the accompanying engraving, illustrative of a novel and desirable feature introduced to public attention by the writer, in the facade of a new house now being built by h m in Ursuline street, Quebec, at corner of Ursule street.

The house itself is an example of what may be done on a narrow lot of ground (some 20 feet or less) when a porch or carriage way is to run through it to rear of house on opposite street. This is brought about by making the house a few feet deeper and locating the stairway to the several stories across or crossways of the building, or parallel to the front and rear walls, instead of, as usual, parallel to the gable or party walls, thus leaving space for two good rooms: a kitchen and an office on the first or ground level, with cellars below for coals and provisions, and on each of the other floors and in attics four good sized rooms of 11 x 9 feet respectively by 15 to 18 feet according to depth, with folding doors between those front and rear on 2nd floor for an extensible dining room with sliding cupboard above kitchen and allowing of throwing the parlor and boudoir into one on the front of the house, with portiere hangings or screen between them as may be required. This arrangement leaves, opposite to the stairs, ample space for closets and wardrobes, and between the two a spacious passage or landing on each floor amply and efficiently lighted through the well hole of the stair case by a skylight over center of depth of building.

Porch ways for vehicles are generally made some 7 to 8 feet in width, but 6½ feet is sufficient, as vehicles do not generally exceed 5 feet 9 inches to 6 feet 3 inches from out to out of hubs, while by laying a continuous curb all along both sides of the passage way, wheels are confined in them in a manner that the hubs cannot reach or abrade the parallel walls of the porch way. Thus when land is scarce or lot confined, every inch must be carefully considered to meet requirements. Returning now to the novel feature alluded to at the beginning of this article, it consists of an ornamental cast iron (or it may of course be wrought, or both combined) open or trellis work stand for flowers on a wooden or metallic box to suit size of stand or in earthenware or other pots of the ordinary size and shape. These stands are placed under the outer window sills, supported on ornamental work and cast iron brackets, two or three to a stand as may be desired or required, according to length of stand, for windows of all sizes, from one of only a few inches in width with room for one plant or pot to windows of 3 to 6 feet or more with space for from three to a dozen pots or plants according to size.

Wire stands or of wicker work have been made and can be purchased attachable to window sills, or suspended therefrom; but as a rule they are trashy things liable to get crooked and bent out of all semblance to a thing of beauty. These stands, as now proposed, are executed and to be seen in size and situ under the sills of a bay window, or rather an oriel (the "bay" being so called when originating at ground level while the "oriel" is higher up) of the house herein above alluded to. Moreover the roof of the oriel or bay is at its apex made flat for a space of some 2 to 2½ by 5 to 6 feet, this being hemmed in by a balustrade of low and appropriate iron cresting, affording space for flowers for the bed room above the parlor.

To render the improvement a practical or practicable one in any and every case, the supporting bracket is of inch by quarter inch wrought iron or steel on edge in pieces solidly rivetted to

gether. The triangular space enclosed by the structural portion of the bracket is filled in with ornamental cast or wrought iron scroll work. This construction while so cheap as to be within the reach of every proprietor, allows of the portions entering the walls being forged or cut off to a point, and of driving the bracket into the wall, whether of wood, brick, rubble masonry or cut stone; and if there be not found in the brick or stone work a mortar joint sufficiently near the ends or centre (when three

brackets are used) to receive the bracket it becomes a simple matter, one in fact of a very few minutes work to cut or drill a hole for the purpose, thereafter filling the same with a wooden plug or wedge prior to driving the bracket home; or, of course, for greater security in the case of heavier stands, the ends of the bracket bars entering the walls could be fish-tailed into an inextricable "lewis" by being driven in (as with a "lewis" for suspending a heavy stone) against a previously introduced iron wedge to cause the fish tail to open or expand.

C. BAILLAIRGE,
Architect and Engineer.

QUEBEC, January 29, 1900.

LAYING CEMENT WALKS.

To the Editor of the CANADIAN ARCHITECT AND BUILDER:

SIR,—In your January issue I read the account of what a gentleman had to say about putting down cement sidewalks in frosty weather, and I thought I would give your subscriber my own little experience along that line.

A gentleman came to me knowing that I had put down a few cement cellar floors, and asked me if I would put down two flights of cement steps, of about five steps each, in front of a pair of houses that he had built. This was about the latter part of October. Being afraid of frost I told him I would not, on that account, guarantee a good job. However, the gentleman said that he could not wait till spring to have the work done, but told me to go ahead and he would run chances of the frost coming before the work was finished. So I went to work at it, the weather being quite open when I started to dig out and get my rock foundation in. Just as I was about to finish it commenced to rain and get quite cold. I got some carpets, canvas, etc., and covered the work for the night, not letting any of the covering touch, as the cement was soft, and there being such a bulk of concrete together it would be slow to set. About midnight it stopped raining, and by morning quite a frost came as I had feared. When I went to see my work I found that the rain had dripped through my covering, had formed quite a frozen skin, and had lifted the top dressing of cement, that I knew if I left it untouched would peel off when dry. I began to think that my job was spoiled after all the pains I had taken with it, and decided whatever was to be done must be done quickly as the bottom layer of concrete would soon set. I took off the covers and let the sun take out the frost, and then took my trowel and gave the work a thorough good hard trowelling, making it smooth. Fortunately the weather kept favorable till all danger of frost was past. I have seen the steps after two hard winters and they are all right. I had this bit of experience in a town about seventy miles north of Toronto.

In building the steps I put in a good rock foundation and shaped the steps roughly with coarse concrete, 6 to 1, then put on ¾" coat over same to the exact shape of steps with crushed granite and sand, 2 to 1 of cement, finishing same with a sprinkling of fine sharp sand and cement mixed ½ and ½, and trowelled to smooth finish, which dried out nice and white like free stone. I used best Portland.

I have seen very bad effects from building steps by forming them in brick and then facing over same with say about ¾" cement finish. The dampness and frost will be almost sure to peel off the cement. If it does not peel off it will be sure to crack, which is alone enough to condem it.

I might here mention for the benefit of interested subscribers that a gentleman of my acquaintance thought he could improve the tar and gravel walk in front of his premises by a surface layer of cement. He asked the council to furnish the labor for putting it down and he would furnish the material. The council consented and the work was done under the supervision of a civil engineer. I was not asked my opinion about it although I felt interested. I went around and watched results. The experiment was a perfect failure. In the spring following the fall when the work was done I found nearly every bit of it had lifted. I think they put too thin a coat on, also that the lack of suction in the old walk prevented a solid job, and the unevenness of the old walk made the top layer thin in some places and thick in others.

Referring back to the article in your November, 1899, issue, in which the suggestion is made to keep all cement walks damp for two weeks after being laid, this is a good idea for warm weather, but rather risky in frosty weather, as the moisture and coldness of the atmosphere causes the cement to set more slowly, which I think would be equal to putting on wet sand or other means of dampening. I would use covering all the same. I cannot understand why the cement walk your correspondent spoke of was so soft after being thrown open for traffic, because about three days in summer and say about four days in the fall is enough to keep traffic off if good cement is used and mixed in proper proportions. Your correspondent says that it was after the rain came that the walk was soft and showed foot prints. The only way I can account for this is that one may chance upon a bad barrel of cement or that loam sand may have been used near the surface which would check setting; also too much water mixed with cement will kill the quick setting of it. That has been my experience with cement.

SUBSCRIBER.

"BAY" AND "ORIEL" WINDOWS.

QUEBEC, January 29th, 1900.

To the Editor of the CANADIAN ARCHITECT AND BUILDER:

SIR,—There is an article in your last issue explanatory of the difference between a "bay" and a "bow" window. Will you please state in your next what the difference is, if any, between a "bay window" and an "oriel?"—the former, as I understand it, originating at or from below level of public highway or so low as to prevent the possibility of passing beneath it; while an oriel is at such a height (say at level of second or third storey) as to offer no impediment to pedestrian or vehicular traffic of any kind.

The law reads that there are to be no projections on ("sur" in the French) any street beyond the line of frontage of the property. Now that this cannot mean over (audessus) seems evident from the fact that if it did, then would it be also illegal to have any eaves or other cornice or even a cornice or entablature or projecting pediment over any door or window; which no one bas ever thought of objecting to.

An oriel to be sure may or might be objected to by a neighbor whose unobstructed view of the street or sidewalk it would interfere with, but so might the projecting eaves of a one or two storey house intercept the view from a window on the same or at a higher level.

Oriels are certainly or can be made very ornamental features by breaking the monotony of an otherwise plain and straight row of buildings and it would be a pity to suppress them. Are you then of opinion that such a salient feature as an oriel can be objected to by the general public or the municipality when it does not trench upon or on the public highway and is at such a height as to offer no impediment to traffic.

In other words can the expression "on" be construed at the same time to mean "over" or should there not be the same distinction as there is in the French version between the words sur and audessus?

This has been a much mooted question of late years in Quebec where oriels are getting into favor and the legal aspect of the question is becoming very pertinent.

CHAS. BAILLAIRGE,
Architect and Engineer.

ANSWER.—Authorities differ as to what is a bay window and what is an oriel window. Gwilt intimates they are one and the same thing if they have right lines on their sectional plans. If circular, semi-circular or elliptical on their plans they may be called bow-windows or oriels. Newlands, who is pretty good authority, says, "A bay-window is a projecting window from the ground or basement on a semi-octagonal or some other polygonal plan, but generally understood to be straight-sided. When a projecting window is circular in its plan, it is a bow-window; when it is supported on a bracket or corbel, and is circular or polygonal, it is an oriel. These distinctions are too little attended to in practice, the terms being often used synonymously."

Describing an oriel the same authority says, "An oriel window is a large bay or recessed window in a hall, chapel, or other apartment. It usually projects from the outer face of the wall, either in a semi-octagonal or semi-square plan, and is of various kinds and sizes. When not on the ground floor it is supported on brackets or corbels. Some writers restrict the term oriel window to such as project from the outer face of the wall and are supported on corbels, and apply the term bay-window to such as rise from the ground."

Nicholson gives nearly the same definition of the term.

Garnsey, in his American glossary of architectural terms, says, "An oriel is a projecting or overhanging architectural structure of any external form divided into several window openings." Garnsey is not to be relied upon as an authority, as he simply reproduced what had gone before. The Century Dictionary, which was compiled by the best authorities attainable, says of the oriel, "It projects from the outer face of the wall, being in plan

semi-hexagonal, semi-octagonal, or rectangular, etc., and is supported on brackets, corbels or corbeling. When such a projecting feature rests upon the ground, or directly upon the foundation of the building it is called a bay-window, or a bow-window." This definition is the one generally accepted, and is no doubt the surest one. Hence, it may be considered that any window, regardless

ORIEL WINDOW, BALIOL COLLEGE, OXFORD.

of plan, that projects from a wall beyond its own foundation is an oriel, while a window having its base on the foundation wall in the ground may be termed a bay-window or a bow-window according to its horizontal section. Usually the base of an oriel is formed with brackets, corbels, or continuous rings of masonry of a more or less ornate character. The French for this window is fenetre en saillie d'oriel, and the German, eckenfenster, which means literally a corner window, the oriel being often placed at the corner or the meeting edge of the two walls. The derivation of the term oriel still, after all the discussions about it, remains shrouded in obscurity.

THE TORONTO TECHNICAL (?) SCHOOL.

To the Editor of THE CANADIAN ARCHITECT AND BUILDER:

SIR,—Now that the Toronto municipal elections are over and the various boards have been formed at the City Hall, perhaps it will be permitted to criticize that of the Technical (?) School.

Looking at the personnel of the newly appointed board of management we find:

An arbitrator on agricultural disputes.
A collector of debts on sewing machines.
A journeyman painter.
A foreman in a book binding establishment.
A couple of architects.
A man in charge of a stationary engine.
The head of an engineering company.
A boiler and engine builder.
Two professional men.
Two tailors.
A clerk and two seekers after fortune apparently without a trade or profession.

Out of the whole board the only ones of use to the right kind of a school would be the foreman, the architects and the boiler and engine builder, and possibly the head of the engineering company—that is to say, five out of fifteen. The other ten are shoved in to fill up, and as rewards for lodge work, jobs for aldermen, sop to defeated candidates and to pander to labor.

Did this aggregation have the faintest knowledge of the class of schools required it might be fair to give them a chance, but while they label the school "technical" they have decided that it is to be "technological."

Pupils will be taught everything by theory but nothing by practice. That is what labor wants. The use of the chisel, hammer or square; the method of tanning or dyeing; the use of a turning lathe; carding, spinning or weaving; paper making or any known use for manual work, would be distinctly opposed to labor principles, and why? Because labor is opposed to their field of work being encroached upon. To-day an apprentice in a shop has to learn what he can, the best way he can, because those above him wish to hold their knowledge, thinking they will not give freely to others what took them so many years to learn themselves.

There are certain interests which should be represented on a board of a school having for its object the technical education required by those who intend following a manufacturing career.

Primarily there are but two interests—capital and labor.

Capital is, necessarily, continually moving for improvements in methods, and were it not for this where to-day would be all the wonderful accomplishments of the last half of this nineteenth century?

But history points out that labor is ever opposing capital. Labo eyes askance any new machine that reduces cost and it is labor's business to prevent improvements being adopted.

Labor says, "Public opinion is so strong that technical schools are bound to be adopted. So we must also adopt them, but we will get control of them and run them as we deem in the interests of labor as it strikes us."

And so capital, which could very materially contribute to make the schools of infinite value to the country, is boycotted, and any person who has any idea of recognizing capital is boycotted; with the result that terror is instilled into the hearts of would be independent aldermen, most of the newspapers, and such other influences as are supposed to be for the best government of the people.

Labor has an individual vote as well as capital, but capital may employ enough labor votes to ruin its own business. (It is wonderful how quickly an employee changes his views about capital and labor when he becomes an employer.)

The great movement for a series of properly equipped technical schools, inaugurated by the Board of Trade,—at which meeting other boards of trade had their presidents, the premier of Ontario and other would be enthusiasts—is all dwindled away, as the brilliancy of the rocket darkens into oblivion when the stick falls to the ground useless.

Why is this? Well, labor in Toronto says no, and some people having a sort of ambition to be shapers of the destinies of this country are afraid to come under the ban of labor, so the end of it all is a continuation of the useless institution for which the whole city is taxed to supply situations for nominees of labor.

The recent meeting of the architects of Ontario would have been an occasion when an expression as to the kind of schools needed could have been given, and it is to be regretted that a matter of so much importance to them should not have received their consideration.

Had the government a spark of independence over the labor people, it would use the old Upper Canada College buildings for a combined school and museum of the right kind.

They sent Mr. McEvoy to learn the class of school needed. His report is in and is on the right lines.

The country now waits to see how far the Hon. Mr. Ross will back up the statements he made at the Board of Trade meeting that was called to consider this question.

Yours truly;
AN EMPLOYER of LABOR.

FACTORY CHIMNEYS.

To the Editor of THE CANADIAN ARCHITECT AND BUILDER.

SIR,—I would like to ask through your Journal if anyone could tell me the cause of cracks appearing in a large chimney that is between 60 and 70 feet high. It is situated between the boilers and the engines, and there is other powerful machinery also close to its base. I was asked by the foreman of the works what I thought was the cause, but gave a doubtful reply, for the cracks appear the same on all four sides. The foreman thought iron bands placed around it would help to remedy the defect. I told him I thought vibration was the cause, but since then I had occasion to cut a hole into the flue, and found there was no air chamber built in the walls of the chimney, so thought the heat had something to do with it. Then again a wall, which is part of the boiler-house, runs up to the chimney on two sides, the chimney forming part of the wall below. Being thus tied in by the roof and braced by those two walls, the oscillation would be kept from going clear to the base, and I thought that was the cause of the checks appearing just above the roof and walls. I send a little sketch showing the character of the cracks as they appear for about 14 feet up from the roof. The cracks do not exceed ¼ of an inch in the worst places. From the roof to the base of chimney or foundation I suppose would be 30 feet or more—I did not measure it.

I would like to hear from some one what they consider to be the cause of the cracks, and also to be told something about building good chimneys of various heights for factories, etc., with an explanation of air space.

YOUNG BRICKLAYER.

[As our correspondent does not give us the thickness of walls of the chimney, or its sectional area, it is impossible for us to give

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any more than a conjectural reply to bisquery regarding the cause of the cracks mentioned. We do not think they are the result of oscillation as only, at most, about forty feet of the shaft is above the building to which the base of the chimney is attached. Doubtless the cracks are the result of unequal expansion and contraction, the greater bulk of brickwork below expanding much more than the bulk above the building, and the greater mass retaining heat longer allows the upper part to cool and shrink long before the lower. One remedy would be to cut the shaft clear off from the building and reinforce it one brick thick to the cracked zone and finish off with offsets. If the walls of the chimney are two or more bricks thick in the zone of cracks perhaps a good repair could be made by raking out the joints clean, wetting the bricks well, and pointing the joints with good strong Portland cement mortar. This might be effectual, if not, the former suggestion might be adopted.

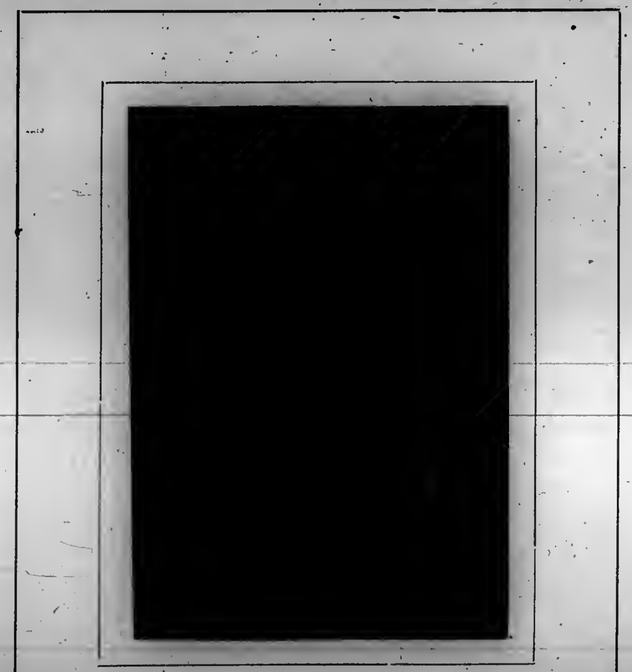
With reference to making hollow walls in factory chimneys, which is frequently done, there is no trick about it. Sometimes the lower corner of bricks are made from fire-clay, particularly when great heat is to be generated in the furnace, and the wall is carried up vertically and bonded here and there to the main wall as the brickwork progresses. The hollow does not usually run up to top of chimney, but dies in the batter of the shaft. For a scientific treatise on the building of factory chimneys we refer our correspondent to "Chimneys for Furnaces, Fireplaces and Steam Boilers," by R. Armstrong, C. E., D. Van Nostrand, Publisher, price 50 cents. This little work contains much information concerning factory chimneys.—EDITOR C. A. & B.]

Mr. George Simpson, formerly assistant civil engineer of the Northern Pacific Railway, has accepted the position of chief engineer of the Province of Manitoba.

The N. T. Lyon Glass Company, of Toronto, have recently been appointed sole agents for Canada for the Solar Prism Co., of Cleveland, Ohio, manufacturers of glass prisms for the refraction of light into dark interiors.

There is nothing magical about advertising. It is one of the tools of trade, just as a chisel is a tool of carpentry. The man who handles the chisel properly can do many useful things with it. If he is careless and awkward he is likely to cut himself.—C. A. Bates.

The annual meeting of the Winnipeg Builders' Exchange was held a fortnight ago when the following officers were elected: President, A. McDonald; first vice-president, A. G. Akin; second vice-president, A. Sutherland; treasurer, J.G. Latimer, re-elected; secretary, H. Elliott, re-elected.



This illustration is from a photograph of a special design which we made in sheet copper after a prominent Montreal architect's model. It was only 27 inches high. Nevertheless, when completed every line was sharp and as distinct as was intended. We are prepared to execute similar work in sheet copper or zinc which we guarantee to be equal in every respect to the best foreign makers.

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MANUFACTURES AND MATERIALS

PICKARD'S BROWN STONE QUARRY, SACKVILLE, N. B.

THE accompanying illustration shows a view of a brown stone quarry at Sackville, N. B., the property of

VIEW IN PICKARD'S BROWN STONE QUARRY, SACKVILLE, N. B.

Mr. C. Pickard. This quarry is situated three-quarters of a mile distant from the Intercolonial railway. The road slopes down to the railway from the quarry, so that a team of horses can handle from six to eight tons at a load.

The deposit of stone extends over 15 to 20 acres of Mr. Pickard's farm, at a depth of 3 to 15 feet from the surface. The beds, which lie in a horizontal position, are from 4 to 9 feet thick, so that unlimited quantities of the stone are available, and can be obtained in almost any length or size.

The sample of stone received from this quarry is a rich shade of brown and has been pronounced first-class in quality. A test made by Dean Bovey at McGill University, Montreal, showed a crushing strength of 9,130 pounds to the square inch.

Over 15,000 cubic feet of stone from this quarry was supplied in fifty days during the summer of 1899, for use in the Methodist College residence at Sackville.

Mr. Pickard is now adding the latest and best machinery for handling heavy stone, by means of which the shipping capacity of the quarry will be largely increased.

Mr. Alex. Bremner, importer of builders supplies, Montreal, is sending out an attractive calendar for 1900.

CANADIAN ARCHITECT AND BUILDER.

VOL. XIII.—No 3. MARCH, 1900 { PRICE 20 CENTS. $2.00 PER YEAR.

—THE—

CANADIAN ARCHITECT AND BUILDER.

A Monthly Journal of Modern Constructive Methods,

(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD).
PUBLISHED ON THE THIRD WEDNESDAY IN EACH MONTH IN THE INTEREST OF

ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

The C. H. MORTIMER PUBLISHING CO. of Toronto, Limited,
Publishers,
Confederation Life Building, - TORONTO, CANADA.
Telephone 2362.
Branch Office: NEW YORK LIFE INSURANCE BUILDING, MONTREAL.
Bell Telephone 2299.

SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to foreign subscribers is $2.50. Subscriptions are payable in advance. The Journal will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrears of subscription paid.

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The Eighteen Club.

WE have consented to place one of the illustration pages in future numbers of the CANADIAN ARCHITECT AND BUILDER at the disposal of the Eighteen Club, which, as many of our readers are aware, is composed of a number of the younger architects of Toronto. This page will bear the name of the club, and will show illustrations of the work of the members. The designs will be selected by a vote of the members at the weekly meetings of the club, and will no doubt be looked for with interest, as exemplifying the ideas and tastes of the oncoming generation of architects.

A Substitute for Portland Cement.

A WRITER in the London Building News describes experiments made in Belgium with slag cement as a substitute for ordinary Portland cement. The results of these tests are stated to have been so satisfactory that slag cement was substituted for Portland in the construction of the works for the improvement of the water supply of Brussels. A saving of $12,000 is said to have been effected by the change in material, the slag cement costing ten shillings less per ton, being also higher, of greater volume, and capable of being used immediately after manufacture. This writer gives the following description of the methods employed to test the material: "In the first place, the conditions of test were identical for all the specimens, whether they related to the tensile and compressive strength, the degree of crushing or trituration, the action of boiling water or the force of steam. It was impossible to adopt a uniform standard of density, because while that of ordinary cement averages about 3.12, it is only 2.75 for the

mortar prepared with slag. It is stipulated that the test-samples of pure cement should develop a strength of at least 330 lbs. per square inch after being exposed to the air for one day and then immersed in water for a week, and that when this latter period was increased to some twenty-five days, the strength should be augmented to 480 lbs. It was conclusively proved that this condition was both worthless and out of date, without taking into consideration that cement is seldom used in a pure state, but, on the contrary, mixed with a certain proportion of sand, which imparts to it the necessary strength. Ordinary cement-mortar generally consists of one part of cement and three of sand, both by weight, and this was the composition of the specimens submitted to trial. At the end of 28 days these specimens were capable of supporting a stress of compression equal to 1,060 lbs. per square inch."

The Cost of Building.

The Carpenters' Union of Toronto have recently demanded that eight hours shall in future constitute a working day. Last year this reduction of hours was granted to the masons and bricklayers, so that it cannot well be refused the carpenters. The cost of this concession must ultimately come out of the pockets of those who put up buildings, and further enhance the expense of building, which has already been considerably increased by the rapid advance in price of land and materials. What will be the effect upon building enterprise remains to be seen. It is argued, not without reason, that, as a result of the prevailing prosperity, the people have more money and can afford to spend it. Certain it is that during the dull times, when land, materials and labor might all have been purchased below par, very little building was done, while coincident with an all round increase in values, came renewed activity in building. While this principle may operate up to a certain point, it is nevertheless possible to so encumber enterprise as to check its progress.

Ancient vs. Modern Systems of Heating.

Canadians who have visited Great Britain have been impressedwith the inefficiency of the heating methods employed there in when contrasted with the hot air, steam and hot water systems so generally used and which are such a source of comfort in Canada and the United States. In recent years the advantages of the heating apparatus manufactured in Canada have been brought before public notice in Great Britain and on the continent of Europe. As a result, many important public buildings have been fitted up with modern apparatus, a constantly increasing quantity of which is being exported. The need for improvement in heating methods is thus expressed by the Building News: "The hot water and steam or hot-air systems of scientific arrangements for warming have yet found no place in our architectural arrangements and all we have attempted is to incase the pipes, and provide cast-iron ornamental cases for the coils and radiators. But we cannot reckon without them in our public buildings, and before very long these systems will have to be expressed."

Architecturat Practice in Canada.

UNDER this title, the "London Architect and Contract Reporter" of February 9th indulges in a lengthy criticism of the Ontario Association of Architects, particular reference being made to the proceedings of the recent annual convention of that body. The "Architect" sets out with the statement: "Why there should be congresses or conventions in such places (colonial towns) is not-always plain. As a rule, architects have to act during the greater part of their lives individually, and occasion for co-operation with other architects rarely occurs. Painters and sculptors do not hold congresses, although it would be as easy for them to find topics to talk about as it has been for several years for architects." In answer to this, it can be said that architects stand on entirely different ground from either painters or sculptors. The practice of architecture is, to a large extent, a commercial pursuit. The architect must know how to handle structural materials in such a way as to give his clients buildings perfectly adapted to their purpose, securely constructed, and with the least amount of material necessary to this end. He is called upon to invest wisely his client's money, and in addition has constantly to deal with manufacturers and dealers in all classes of materials, and with contractors in a dozen or more trades, who must receive from him their instructions as to the manner in which these materials should be employed. There is no such commetcial side to the work of the painter or sculptor, hence there does not exist the necessity for associations to consider and compare experiences and methods.

The inference is deduced that the Ontario Association of Architects cannot exert any influence or achieve any useful purpose because of its limited financial resources, and it is called a shabby genteel imitation of the American and British Institutes. On this point the Association's critic says: "It was found necessary, owing to financial straits of the Association, that the office of registrar and librarian would have, for a time at least, to be honorary. Poverty may be creditable, but the people of Toronto are sure to conclude that a society that is unable to pay a single official has no right to exercise influence upon them." No sensible man will admit that a society is useless because it does not see fit to employ a paid officer. We have for example the Toronto Guild of Civic Art, which has no paid officer, but which nevertheless has exerted an influence in connection with the decoration of the new municipal buildings, the conduct of School Art Leagues, and other matters of equal importance.

The action of the Ontario Association of Architects in soliciting subscriptions from prominent citizens of Toronto to establish a fund to found a travelling studentship is ironically referred to as an example of courage, "which would hardly be paralleled by a member of any other society or calling in the city, and as illustrating the hardihood required by a man when he becomes a member of an architectural society." We fail to see the matter in this light. In Canada we have no great public museums and art galleries to be centers of education for our students, who are therefore compelled to go abroad to secure the education which would fit them for their future work. Neither have we a leisure class who can devote their time to the promotion of art education. Under these circumstances, the Ontario Association of Architects, being desirous of providing for the education of the on-coming generation of architects, considered that business men who might not be able to devote time and thought from their business to assist a worthy object of this character, might nevertheless be willing to contribute of their means for such a purpose. And as a matter of fact, although the full amount required was not subscribed, a sufficient sum was promised to show that many of those to whom the request was preferred were fully in sympathy therewith and with the object sought to be attained.

Reference is made to the educational work on which the Association have decided to embark, and the conclusion is reached that "as the improvised professors were not selected, it is not likely the teaching will be started until an indefinite time elapses." The members of the Association, who have undertaken to give their time for the benefit of the students, do not regard themselves as professors, either improvised or otherwise.

The part taken in the convention by the Eighteen Club is not fairly stated. The Eighteen Club is not in any sense a rival of the Ontario Association of Architects, nor is it altogether antagonistic to the latter organization. While it has not been able to see eye to eye in some matters, it is nevertheless, to a large extent, in sympathy with the Association, and likely to join hands in carrying out the undertakings, especially with regard to education, decided upon at the recent convention. The Ontario Association of Architects is not apeing the older societies, as it has been accused of doing, but is seeking, as far as possible, under different circumstances and conditions, to profit by the experience of these societies.

The most striking feature of the article to which we have referred is the display of the purse-proud spirit and the lofty air of contempt assumed by the writer towards an institution which is striving under difficult circumstances to perform a useful work on behalf of architecture. It will be noticed that while the article bristles with criticism of a purely destructive character, it does not offer a word of sympathy or encouragement, or make a single suggestion for the improvement of the condition of affairs which it so severely condemns. From beginning to end it displays conspicuous lack of knowledge on the part of the author of the matters of which he writes so loftily. If the other articles appearing in this publication of sixty years' standing have no better foundation in fact, it will soon cease to carry any weight. We cannot help feeling surprised that a professional journal of the age and supposed standing of the London Architect should have condescended to the style of criticism contained in the article which we are discussing.

The sand blast, invented by C. B. Tilghman, of Philadelphia, and patented in October, 1870, has revolutionized the old methods of preparing stone and glass for the purposes of building and decoration. The engraving, cutting and boring of these materials, as well as of some metals, are accomplished by the percussive force of a rapid stream of sharp sand driven against the material by an apparatus operated by compressed air or a mechanical fan. A stencil is employed on the surface of the material to direct the action of the sand stream. By the use of a photographed coating of gelatine upon glass, reproductions of line engravings are finely executed at a small cost. The patterns on the cheaper kinds of colored glass are performed by the sand blast, a stencil being used upon the colored panes and the blast operating to remove the color from the exposed parts.

THE BEAUTY OF FITNESS.

THERE is no surer sign of the innate provincialism of both ourselves and of our esteemed brothers of the United States than the inflated character of our architecture. There is too much architecture to the square foot, or it is of too high a class for the buildings. It may seem presumptuous to class with ourselves the travelled architects of New York; to call them provincial who have seen the world; but knowledge is not culture; indeed knowledge acquired in haste for the sake of possession is apt to choke the growth of culture; which is an emanation from within, a process of thought which has little foresight for the commercial value of knowledge, but appropriates what it wants for its present use and no more. This is a slow process and may, alas, take a generation or two in North America. In the old world, where a man cannot take a walk out of doors without running up against a standard example, he has a better chance, if he starts fair, of understanding the true nature of architecture. He at least knows what much-praised architecture is like and will not be misled as we often are who derive our knowledge only from descriptions. Was not Ruskin the greatest of describers, and has not Mr. Howells said, in his Venetian Life, "I remember how, just after reading Mr. Ruskin's description of St. Mark's church, I, who had seen it every day for three years, began to have dreadful doubts of its existence!" These descriptions are a work of art in themselves, treating the building merely as a basis or an effort to arouse the imagination to feel what the writer feels about it after patient study; and it is not to be wondered at if the inhabitant of the new world when he visits the old and finds himself at last before a great example, should feel inclined to exclaim with the poet on the seashore, "Is this the mighty ocean, is this all?" But he has made a great step towards true feeling for architecture when he got there. When we were young we imagined kings and queens to be much more accustomed to wearing their crowns than turns out to be the case, but they are on the whole more dignified without them, and dignity was all we wished to attribute to them. The person who figures to himself the highest state of society is apt to imagine brilliancy of wit and a graciousness of demeanour which would be rather uncomfortable to live with. He has lost nothing when he learns the greater grace of simplicity, although it's attainable by ordinary people. In the same way there is nothing lost but much gained to the provincial student of architecture when he finds out that architecture has its limitations; that it is not always posing but often at its ease, and is then too usually most attractive; that even when it has a representative function to bear and adopts the high manner it is most effective when most natural; and where it is chiefly utilitarian it comes off with greatest dignity by being simple and straightforward.

The truth of the matter is that the ultimate test of architecture is fitness. The magnificent civic building, the solemn cathedral, the plain and substantial warehouse, the stately mansion and the snug cottage are all architecture and all works of art, provided only they keep each within its own limits. One is not as full of graces as another, but it would be hard to say that each in its way is not beautiful. In its own place whatever is right is pleasing. The elephant, for instance, is to us a lumbering monster whose proportions border on ludicrous. But Henry Drummond, in his Tropical

Africa, says—"To see the elephant at home is a sight to remember. The stupendous awkwardness of the menagerie animal, as if so large a creature were quite a mistake, vanishes completely when you watch him in his native haunts. Here he is as nimble as a kitten, and you see how perfectly this moving mountain is adapted to its habitat—how such a ponderous monster, is as natural to these colossal grasses as a rabbit to an English park." Doubtless if we could always see in their own places the animals which we call ugly, we should choose another word to describe them or admit the beauty of ugliness in its right place. May we not also venture to assert the ugliness of beauty in the wrong place? A world all ugliness would be oppressive; but would not a world all elegance be wearisome? We must have alteration like the discords in good music. If everything were as sweet as the rose we should die of it "in aromatic pain."

If ugliness in its right place ceases to be ugly and beauty in its wrong place ceases to be beautiful this is only to say that the perception of beauty or ugliness is but the perception of fitness or unfitness, and this is the test of beauty in architecture. What does it mean? What is this fitness which is beautiful? There has been much said in abuse of what it is now-a-days the fashion to call Realism in architecture and it may be necessary to disclaim any connection with the Realism which consists in the painful exhibition of construction for the sake of exhibiting it or considering it necessary to proclaim on the outside all the uses of the interior. But that a building should appear to be what it is; that it should appear to be what it is in this country, not in another country; and in this century, not in another century; in the material of which it is built, not in other material however much more splendid; and, if the construction must be protected and must therefore be concealed, that the protecting material may appear to conceal construction, not to display it; these are the realities which are involved in an appearance of fitness. It would be absurd to speak as if there were no advance in the agreeableness of the architecture of recent years, as well as in its importance; or to overlook the remarkable development in constructional skill. But the habit of mind which makes a fitting design is not common. The designer is usually after something else than his real problem, which he either does not recognize at all as his problem, or frankly abandons as not practical politics. The result is only half a success. The tall buildings of New York are the great architectural creation of this century. The dark spire of Trinity church ensconced among a group of these white buildings is a study in the grand picturesque; the skyline of the peninsula of New York would be a theme for Turner; but closer inspection leaves one apathetic. There is not only not one throb of pleasure but a feeling very like contempt. The draughtsman who has been allowed to flounder over these surfaces has not had the pluck to see that in the truth was his effect: that the mass was everything, and that the same straighforward method which he has applied so successfully in the shingled cottage, where he was not afraid nor misled by ambition, would serve his purpose far better than the silly simulations of construction and the undue ornament with which he has made these majestic fronts frivolous and unmeaning.

The key to the satisfactory solution of this problem is to face it. It is the key to the solution of all architectural problems and to that fitting diversity between buildings of different kinds which may be said to constitute the design of cities. The determination to make a good thing of the conditions of arrangement and construction before the designer, this is the sure road to character, which is the greater part of beauty in architecture as in everything else. The temptation to look outside of the problem for a motive; to adopt motives from distinguished monuments of the past, because they are admirable in their own place, and work them into the design in hand, where they are not in place, and will not be admirable, is the temptation of imperfect training. A riper culture and skill will see in the problem in hand something to touch the imagination, and in the limiting conditions a clue to the design. Limitations accepted at first perhaps with pain, but at any rate accepted, will when grappled with, turn out to be the life of the design. It is an old story that the triumphs of art are but its difficulties overcome. The etcher who has but a line to represent nature (which has none) is forced to think; he learns to abstract the essence of a scene—and men who love art love etchings. It is its limitation that makes the art. Even wool-work, within its limitations, is an art. It is barren labor to make one thing look like another when the key to beauty is to make it look like itself. This is the really inspiring work, and it suggests a field of study abroad as well as at home. We go abroad to see great buildings and come home to scatter their details over buildings great and small; quite forgetting that at home, in their own place, they stood apart, central jewels in a setting of much plain work. This plain work we should study quite as much as the great monuments. There is much traditional good taste and suitability to be seen in it. To wander for a day in one of these towns is to receive an architectural impression, consciously or unconsciously, which is perhaps as great as that which we receive from the monumental work we go to see, and is worth our study also for the reason that we lack it at home.

BY THE WAY.

An International Congress of Architects will be held in in Paris from July 29th to August 4th. Among the questions which will be discussed during the Congress will be that of the "cheap dwelling house," which has been noted on the programme according to the request of the British architects.

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The recent heavy fall of snow is said to have caused the collapse of a skating rink at Milton, a hardware store at Woodstock, and a livery stable at Paris. Fortunately no loss of life is recorded, which is due to good luck rather than good management. So long as rule of thumb methods continue to be so generally employed in construction work, we may expect to hear of failures of this kind with now and then a disaster involving loss of human lives.

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Regarding the proposal to reduce the fee for a plumber's license from $10 to $1, it is to be hoped that the City Council of Toronto will decide to let well enough alone. The City Medical Health Officer and the Master Plumbers' Association have promptly protested against the proposed change on the ground that it would permit incompetent men to engage in the plumbing business and thus injuriously affect the sanitary condition of the city, which under the present regulations is in a tolerably satisfactory condition.

THE ONTARIO SOCIETY OF ARTISTS' 28TH EXHIBITION.

In endeavoring to put down a few notes on this year's exhibition of the Ontario Society of Artists, one is brought face to face with the unsatisfactory nature of all criticism. One man's opinion can never be anything more than one man's opinion, but one man may perhaps be a sort of representative delegate from the general public to those most interested, viz., those who have labored over these works of art, and after many an hour of anxious thought have brought them to a stage of readiness to be exposed to the public eye. The chief value of the jottings which follow is that they are the sincere utterances of an ordinary observer.

No. 31, "A Red Roof in Surrey," by C. M. Manly. In this picture Mr. Manly has displayed his old faculty of selection, and has given us somewhat more breadth of treatment than he usually allows himself. In taking this characteristically English scene, the artist has displayed some courage, seeing that it involves a stretch of rather uneventful grass at the base of his picture—always a difficult thing to manage, but, as a whole, the picture is pleasing. In "Harvest of the Sea," No. 138, Mr. Manly has a subject in which he has introduced more figure drawing than is usual with him, and has done it well. In 141, "Ockment Water," he is again in his old and well known style, and one can pick it out for a Manly from the other side of the room. His water colour, "In an Old Cathedral City," No. 137, reminds us very much of a similar effect by the lamented Mr. O'Brien. It is a scene that has been very frequently portrayed. In 139, "In a Peach Country," Mr. Manly has as pretty a little sketch as one need hang.

Among the newer stars that have arisen on the horizon of the society, is Mr. J. D. Kelly, whose clean and well rendered effects in water color are highly successful. He has got a good deal of light and bold color into No. 132, "A Muskoka Trout Stream." No. 131, "The Wild Fowler," is a pretty little subdued bit of treatment.

Miss Wilhemina D. Hawley gives us examples of her clever patch-sketching—No. 124, "The Woman in White," and 120, "By the River,"—in both of which the good figure-drawing somewhat atones for the slobbiness of the finish. It is only on rare occasions that sketches can he exhibited in galleries, and perhaps this is one of them.

In 148, "The Day is Ending," Mr. H. Robins shows a fine feeling for nature and a good eye for color and a faculty of composition which is not above learning from established precedents. It is pleasing to remark that this picture is sold.

Again Mr. Reid attempts the task of showing us the decorative qualities of a hay-stack in "A Cloud Effect," No. 153, and gets over the difficulties of the case as well as could be expected.

One of Mr. Chavignaud's most characteristic effects is shown in a "A Dutch Landscape, (Evening)," No. 106. The row of gaunt trees is of course indispensable and familiar, but Mr. Chavignaud manages it rather better than usual. He has also three other manneristic Dutch drawings. Mr. Chavignaud is industrious and forcible. He is also not without poetic feeling but it is too much of the dark gray order.

As "A Design for Decoration" Mr. Gustav Hahn's drawing, No. 127, is bold, striking and inventive, but we would like to know what that decoration is for.

In No. 51, "The Widower and His Daughter," Miss Laura Muntz has been bold enough to give us a picture with a story. This is, we know, against the canons of the hypercritical, who tell us we should paint for "art's sake only," and let the story go hang. Nevertheless, pictures with stories, especially when they are so full of ability as Miss Muntz's, will continue to attract a large amount of notice. Miss Muntz's fine handling is also shown to advantage in No. 46, which she calls "Eventide." An old Frenchwoman and her daughter are returning from, or going to, vespers. The contrast of the faces, and the work of years on that of the elder woman are remarkably well shown. In No. 48, "In the Sunlight," Miss Muntz again gives us a delicious bit of color and dash, and equally spirited is "The Child with a Rose." Miss Muntz's "Portrait of My Father," is by a long way the best portrait in the exhibition.

Mrs. Reid's "Roses, Lady Dorothea," No. 57, is an example showing that lady's mastery of form and her inimitable technique. Its color has a splendor and transparency which mark it as one of the best of recent flower paintings. Equally charming and full of sunlight is her "A Verandah," No. 60, a picture of luxuriant growth and the juiciest of coloring. The glowing sunlight is also well rendered in her "Poppy Garden," No. 59. Another triumph of this artist's is No. 58, "Looking East." In this picture Mrs. Reid shows a mastery of her materials which is very remarkable; "this sort goeth not out but by prayer and fasting." In this picture, too, she has had the courage of her convictions, and has not hesitated to paint clouds as she sees them, nor to give us a delightful spot of color in the gable of the little house.

J. W. Beatty has painted a little gem in No. 8, "Evening," and we note that it has attracted a purchaser early in the Exhibition. His handling of the sky and trees is full of craftsmanship.

Miss Tully's fine pastel portrait of Mrs. Russell, No. 80, is marked by great freedom of handling and that mastery of materials which long ago gave the artist a favoured place among those who deal with this medium. Miss Tully's pastels are indeed something that the artistic world of Toronto may be proud of. She has also considerable insight into the characteristics of the sitter; in this example the beholder has no doubt of the reality of the portraiture. It has actually human qualities, while the draperies and accessories are likewise exceedingly well rendered, though we cannot say that we altogether like the handling of the neck, the exceeding breadth of the method by which the lights are put in giving a woolly appearance. The same ability to catch the characteristics of the sitter is shown in the portrait which is hung above that of Mrs. Russell, No. 79, in which Miss Tully has chosen oil as a medium. Her "Evening Effect, (Decorative Panel)," No. 84, has a sympathetic feeling for nature and much poetry in it. In "The Poplars," No. 86, which the artist brackets "Afternoon Effect," she has introduced us to an experiment which no doubt will be interesting to artists, but can scarcely be appreciated by the general public.

Mr. F. H. Brigden gives us six interesting water colors, in which we see that the progressiveness of this young artist has not come to its limit. "In the Harbor, St. John, N. B.," No. 93, though it represents a somewhat usual method of treating a subject of this kind, gets over the difficulties of the situation with considerable skill. In the water color entitled "St. John River,' No. 94, we have one of those panoramic effects which, while they are useful in giving the beholder a fair idea of the surroundings, scarcely afford the artist any better opportunity than he finds in a more limited area. The best part of this picture is the foreground, which is very happily rendered and full of artistic feeling and life; the distant landscape is somewhat heavy. The same skill in handling the foreground is shown in No. 96, "In the Valley (August.)" Familiar as this scene is to all Torontonians, the picture gives a romance to the locality of the Don which is not found there by everybody.

In No. 44, "The River Road," a large oil painting, Mr. Manly somewhat escapes from himself and his usual habitudes. He gives us in this an English village scene, which is redolent of the characteristics of the old country. He treats it with a juicy brush and much freedom, though we do not quite like his handling of the dark green rushes at the right hand side of the foreground; still it is a lively and interesting effort, only wanting a little more time and putting together to make a very good picture of it.

In No. 128, "The Return of the Fishers," Mr. McGillivray Knowles has a subject that suits well his practised skill in figure drawing. The work is catchy, breezy, and does not require the frame to make it a satisfactory composition. His little picture of "St. Paul's," No. 130, makes the heart of an Old Countryman turn to the land of his fathers, but it is not everybody who can put the great dome into a sketch with such facility and effect as Mr. Knowles. "Newlyn, Cornwall," is an "easy one" for this artist, seeing that he is as familiar with the brown sails of fishing boats as he is with the store awnings on Yonge street.

Mr. F. S. Challener's eye for color and craftsmanlike observance of detail are both evident in the two little water colors which bear his name, namely, "Old Mosque, Near Jerusalem," No. 110, and "A Country Road," No. 111. This last is a genuine bit of Ontario, and would also make a pretty little adornment for a room.

Very good examples of Mr. J. W. Blatchly's well known style are to be found in the works Nos. 99-102. Mr. Blatchly has a good eye for color, and in No. 101, "A Canadian Homestead," he has glorified an ordinary bit of country scene, which he presents to us transfigured with the glorious sunlight of summer. We prefer, however, "Declining Day," No. 99, in which he has given us a composition that shows not only much ability, but capacity for seeing nature.

Miss Clara E. Galbraith exhibits considerable freedom and

strength in No. 120, "Old Hoover Homestead on Lake Erie." I is rather a contrast to the highly finished method of the last mentioned artist, but it shows that Miss Galbraith is not only a keen observer of nature, but that she has attained considerable mistress-ship of pencil and brush.

Mr. Carl Ahrens has some Ahrenesque landscapes which are full of mysticism and strange color. We like the best his "Landscape," No. 4; next his "Early Morning," No. 2, which has much poetic charm; we would as soon have "The Coming of Night," No. 1, as any other conundrum of the kind, while his "Nearing the End of Day," is really delightful and should find a ready purchaser.

Mr. Edward Morris does not paint for ordinary people or in ordinary ways, nor does he, to our thinking interpret nature any less mystically than Carl Ahrens. We take his disregard of the ordinary conventions to be a little too disregardful; but, given a proper amount of shutting one's eyes to nature and detail, his pictures may no doubt be enjoyed when one stands far enough away from them and looks at them with a selective eye. These things are true of Mr. Morris' "Landscape," No. 45. He and Mr. Ahrens are the mystics of the exhibition.

Mr. W. Cutts is one of the men who have made progress during the past eight or ten years. His "Far into the Summer," No. 10, is a workmanlike landscape. In "A Winter's Sunset," No. 13, he has shown that he can tread in the footsteps of the veteran Jacobi.

Miss Florence Carlyle has a clever portrait of a young girl in a white frock and black stockings, with roses scattered about her. It is a tour de force in its way, and shows some of the virile vigor that characterizes Miss Muntz. Miss Carlyle's "Hollyhock Time," No. 19, is painted in the interests of the paint and color manufacturers.

Mr. Reid's "Study in Low Tones," No. 54, is a really good piece of portrait work, as those will concede who have the honor of the acquaintance of the well known and gifted lady who is the subject, and who have any notion of what a portrait should be. His pastel of a man reading has, we understand, been chosen by ballot as a purchase of the Ontario Government, and, on the whole, it was the best of those available, despite a somewhat chalky pallor in the flesh tints.

One is at once struck by Mr. J. W. L. Forster's large portrait of Mrs. Coleman Stuckert. The attitude of the subject is easy and the whole effect of the picture is somewhat imposing. It is one of Mr. Forster's happiest efforts.

Mrs. M. E. Dignam, in her "Roses and Bluebells," shows a worthy example of her practised skill in flower-painting, the drawing and composition of the roses being especially good.

Miss Gertrude Spurr has a definite and characteristic style which may become a fetter unless she gives more scope to her imagination, since a picture should be something more than the portraiture of a place or scene. Nevertheless, the artist shows no falling off in her picture of Lynmouth Harbour, nor in the other examples which bear her name, conspicuous among which is "Scarboro, Herring Season."

The same can hardly be said of Miss Hagarty, whose contributions do not equal those of last year, and are not distinguished either by good color or good drawing.

Miss Ethel Heaven's best effort is a pastel in profile which displays considerable facility of handling, and good color. In her upright panel she is less successful.

Mr. E. Wyly Grier has a good likeness of Hon. S. H. Blake, Q.C., which shows the percunial youth of the subject to great advantage.

Mr. Bell-Smith has one oil landscape and three water colors, which display much facility but are not his best. In the water color "Evening (Holland)," No. 39, the artist has been too much of an anti-Boer to give Holland any flattery.

Mr. W. E. Atkinson is represented by two oils and one water color. The oil landscape, "Winter, Holland," No. 5, is a good example of this artist.

Miss H. E. Bastedo's white peonies gleam out nicely.

Mr. John Innes shows one example of his work, and it recalls the artist's recent trip to the Northwest in search of material. He calls the picture "Indians in a Blizzard," and very successfully represents the wintry landscape of bleak prairie. In the drawing of the horse Mr. Innes is a past master, while what he doesn't know about Indians is not worth mentioning. Accordingly we have in this picture not only good artistic work but an historical 'document' of the greatest value.

A little more characterization of the rocks in Mr. R. H. Gagen's large water color, "When the Flowing Tide comes in," No. 112, would have made it an even more considerable picture than it is. It must not, however, be supposed from this that Mr. Gagen has not to a large degree grasped the facts of nature. To a very great extent he has, and there is no artist we can think of at the moment who has made more advance during the past four or five years. Both in this picture and in No. 114, "Sea Sand and Summer Sky," Mr. Gagen shows the genuine marks of a true nature-lover, while his "Lobster Catcher," No. 113, is a triumph as to water. He has almost entirely left behind him the heavy opaqueness that was once a besetting quality with him, and we must sincerely congratulate him on this year's contributions to the O.S.A.

There is not, to our think, much connection between the name and the subject in Mr. G. A. Reid's decorative panel "Music," No. 53. The nude youth who leans against the tree and is lazily blowing a few notes on his shepherd's pipe does not look as though he had much "music in his soul," neither does he look, as the poet says, "fit for stratagems and spoils." He is just an ornamental adolescent, displaying the beauty of line and curve that are to be found in the human body, and being dreamily lazy about it. We know enough, however, not to waste time in making too much of the literary meaning of decorative panels, and are quite willing to concede that the artist has, in this example, given us much that we may regard with satisfaction. The splendor of the lumpy clouds in the top left hand corner is a thing to be seen and enjoyed, and the masterly harmoniousness of the work is freely apparent.

Of Mr. Henry Martin's two examples, we prefer the upright water color, "Chateau Dieppe, France;" the larger picture, "St. Mark's, Venice," is a considerable effort, though the perspective, or perpendicular, or something, seems to be a little out.

Mr. W. St. Thomas Smith gives us a Turneresque effect in No. 167, "Sunset in the Southesk, Scotland," and in so doing invites comparison with the memories of well known pictures. On the whole, the deceased painter has the best of it, though, of course, we do not think for a moment that Mr. Smith had any idea of Turner in his mind when he started on the work. In No. 167 we have a St. Thomas Smith picture pure and simple, and although the effect of the storm-driven sky is well given, we must confess that we have seen much better examples of this artist, who has a distinctive and worthy method, from which considerable progress may yet be expected.

Mr. Harry Spiers can paint a "don't care a cent" agricultural horse as well as the next man, and perhaps better. His picture of "Harrowing," No. 163, is full of what is called local coloring and should be bought by the government, or by collectors, as an aspect of farm life that is, we are told, destined to go out of fashion through the elimination of the horse from modern uses, in favor of electricity. This artist has also a noteworthy sketch entitled "Market Day at Hamilton," in which much deft craftsmanship is shown.

T. Mower Martin has three water colors, which, while of a not particularly ambitious character respectably represent his practised brush.

Mr. Challener has a bright oil painting of a bonnie Canadian girl sitting in the midst of a summer landscape. His decorative panel of three nude nymphs and a sheep shows capital composition and drawing and is, besides, a nice bit of color.

Miss Eleanor Douglass has an ambitious little oil which she entitles "By the River."

Miss Carrie Hillyard has a couple of clever and hopeful works.

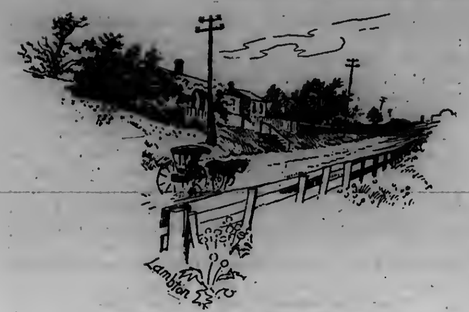
Of Mr. Staples' six works we like best his flock of sheep in No. 75, which he entitles "The Drover." "Evening, Toronto Bay" is too topographical. "The Brook" is green and bushy and rather nice in feeling and so is "Largo," the old man playing the 'cello.

Mr. W. A. Sherwood is represented by a single feminine portrait.

Mr. Charles J. Way has four very interesting and capable water colors, in which there is much good handling and lots of good drawing. He is a Montreal artist whose pictures everyone will be pleased to see on the walls of the Toronto gallery.

The exhibition is brightened this year by the very clever statuettes of Mr. J. Lisney Banks, a sculptor of no mean ability. His presentation of the elephant in two of them is worthy of all praise—they are by a long way the uniquest things in the show—while his portrait "Alva" is full of clever work.

BERNARD MCEVOY.



Lambton Mills, Ont.—Sketched by A. H. Howard.

CANADIAN ARCHITECT AND BUILDER'S STUDENTS' COMPETITION FOR A SUBURBAN BICYCLE CLUB HOUSE.

SEVEN sets of designs were received in this competition. Owing to a misunderstanding they were not passed upon by a committee of the Province of Quebec Association of Architects, as was our intention. The president, Prof. S. H. Capper, has, however, furnished us with his personal notes on the drawings which are printed below. These notes are arranged alphabetically and do not indicate the order of merit of the designs. The awards are based upon the accompanying report of the committee of the Ontario Association of Architects:

REPORT OF O. A. A. EXPERTS.

We place "Kenilworth" in the first place, although his elevations have badly disregarded the instructions as to fitness for reproduction, being too timidly drawn; he wants to cultivate a more vigorous line. But we consider that on the whole his plans and elevation bespeak a larger grasp of the subject. There is more suitability to their purpose in the elevations. Roofs and wall spaces have more inviting breadth and restfulness than most of the other designs. The plans show better disposition of the various rooms with regard to their different functions. The ground floor hall has its lounging space, fireplace, etc., better arranged to achieve their purposes; would suggest that gallery of gymnasium should be connected with billiard room to give more continuity to whole. The external access to former somewhat isolates it.

"Spes" is placed second, although his drawing entitles him perhaps to first place, displaying considerable firmness of touch, marred however by much indecision in the matter of his deeper shadows which are very undecided in their direction, and not at all suggesting the construction. The indication also of shrubbery is very childish. The plans are considered secondary for reasons as follows: Ground floor hall, though large enough, has chimney in a most pretentious position, not the cosiest or most serviceable, being too much in the thoroughfare to various rooms. The reading room we consider would be better a storey higher. The apartments devoted to the ladies want connection, and their toilet conveniences badly disposed. His billiard room omits one table. It is questionable if the gynasium would be well placed, with its noises, on the top floor, although "Spes" would be handicapped to account for his great roof if not allowed so to place it.

"Dinah" is placed third, although there is much to be commended in his design. We believe his idea of utilizing the basement and the first floor under and over verandah is the proper one for a frame structure such as a bicycle club. The first floor and basement can thus be planned to suit their requirements, and if this results in somewhat limiting the rooms of ground floor still it must be remembered that the verandahs of ground floor are a vital necessity of a summer club, as valuable as rooms. To criticise we consider ground floor hall is too unstudied and not inviting or effective in giving impression of hospitality. Hall seat no one would sit on from choice, being unlighted. As to kitchen and dining room on first floor, although not customary, it might be good. There is fine corner room for dining room which would have good outlook. We consider basement billiard room would have poor light and the access to same somewhat tortuous. Bicycle room not large enough and entrance to it poor. Rendering of perspective quite effective except glass of windows which lacks suggestiveness of depth.

"Forget Me Not" placed fourth, is a very quiet good line drawing, not we think, however, suggesting boy's club, but rather ladies school or convent. The verandahs, we think, like some of the other designs, are much too tall to give proper impression of cool and shade. Shingled columns are open to criticism and certainly moulded capitals to same are incongrous. Plans are not well considered. Basement space badly laid out. Ground floor hall lacking in lounging space. Dining room and kitchen in poor relation to each other. Not good position for reading room, with entrance off dining room.

"Mayfly"—There is commendable sobriety about these elevations, somewhat in colonial style. We do not think the angles of roof well chosen, and lack vigor. The draughting is neat but timid. Would recommend study of good book on rendering in line to author of this design. While the columns of verandah may be satisfactory in appearance, their capacity is not sufficiently utilized, the verandah being narrow and so tall as to lack shade essential to such a feature. The whole building is somewhat high in appearance for purposes of suburban club. Bicycle entrance well arranged but not near enough to main entrance. Dining room is too small and the passage way to billiard room is not good and would be dark, and the billiard room is smaller than called for.

"Vadis"—placed sixth—The elevation strikes one as having height at the expense of breadth. The ceiling of the verandah is somewhat too high to be useful and the design generally is lacking in characteristics of suburban designs. The construction is somewhat of a style that is passe, but is in accord with much English work, and shows fair grouping for that style of a building. The basement is well laid out, but the bicycle accommodation is inadequate. There is neither refreshment room or kitchen provided as required, the omission of which spoils an otherwise compact plan.

"Marcus"—placed seventh—The elevations bespeak inexperience and the rendering is very speckled. A study of some good work would show the author where he is deficient; on the whole his work is promising, showing, as it does, bold projection of eaves and good grouping of windows. Like most of the others, the design is not sufficiently suggestive of cosiness, which ought to be a feature of a club house. The verandah is much too meagre—also the front entrance. The one good feature is the combining of gymnasium and bowling alley. The lavatory accommodation is inadequate. The plan throughout shows want of experience, giving practically no accommodation for lounging and refreshments.

Practice and experience will make a great difference if the author continue to show continued diligence.

It is a matter of surprise that no competitor adopted a style lower in character and with wide projecting eaves to the verandah so that occupants could sit near the parapet and still be in the shade.

Signed { A. F. WICKSON. / JOHN GEMMELL.

The authors of the designs which have been awarded first, second and third positions respectively are as follows: "Kenilworth," (Mr. Clarence Thetford, 237 Dufferin street, Toronto, Ont.); "Spes," (Mr. Willford Gagnon, 25 Melbourne ave., Westmount, Montreal); "Dinah," (Mr. Frederick C. French, 84 Wellesley street, Toronto.)

NOTES BY PROF. CAPPER.

"DINAH".—(Plan)—Gymnasium on ground floor, with billiard room beneath it in the basement, dining rooms being on 1st floor. It is a serious defect in such a building as this to relegate the billiard room to so inconvenient and secondary a position; nor is this at all redeemed by a basement cafe alongside it (in unpleasant proximity to a lavatory, which is none too well lighted.) The billiard room itself is awkward in shape, being spoilt to fit in the bowling alley. On ground floor the ladies' room (with lavatory off it) and the reception and smoking rooms are well placed and the covered gallery is large—a good feature, both in plan and elevation. The gymnasium itself is well placed, with good locker accommodation off it. Baths are shown, but the w. c. accommodation is quite inadequate—a single w. c. for this floor, and that entered from two sides—a quite impossible arrangement. The main staircase has a lavatory most conspicuously at the exact head of the stairs, as public as possible; a little re-arrangement would have improved this and increased the size of upper hall. Kitchen is ingeniously arranged for service, but the little service room itself is inadequate; it is badly lighted and has three doors in its small space. On attic floor the caretaker's house is well separated, a good arrangement; but it has no bathroom accommodation. There are five bedrooms for the club, equally destitute of bathrooms. The service stair in this design is good, but it has no service entrance, which would half destroy its utility. The entrance to bicycle store in basement is rather awkwardly managed with its sharply curving steps. (Elevation)—The design is shewn in a perspective, in which the deep verandah or gallery is not very successfully indicated. Externally, the club house is simple, and free from the terrible vice of pretentiousness. The entrance porch has too much the air of having been "stuck on"; otherwise the design is satisfactory, if slightly commonplace.

"FORGET-ME-NOT."—(Plan)—The general scheme of this plan is very good; it is simple, and this very simplicity would increase its convenience in practice. Gymnasium and billiard room are both on the principal floor, the former with locker and toilet accommodation conveniently placed; as shewn, however, the latter is quite insufficient—no baths and only a single w. c. The bowling alley in the basement is well managed, there being more space for spectators and loungers than in most of the other plans; it is a defect, however, that the lavatory only enters off this. The bicycle store-room also is conveniently planned. The 1st floor on the other hand is less successful; as planned, the service from the kitchen has perforce to cross the upper hall, which would be highly inconvenient; the reading room also is only reached through the dining room. The absence of any communication (save by "dumb-waiter") between kitchen and 1st floor and store-room in basement, is bad; all the service would necessarily invade the principal stair—a great inconvenience in a club. No ladies' accommodation is provided, but none was asked for in the program. In the entrance hall much greater interest could have been imparted by combining the staircase with the hall; the two are shown unnecessarily separated, and would be very commonplace in execution. There are outside galleries on three sides, an excellent feature; it is a question, however, if more might not have been made of these by carrying them continuously round the three sides of the house, although the lighting of billiard room might have been somewhat affected. (Elevation)—The elevations are regular, and symmetrical, though more might have been made of them in the pen-and-ink rendering. The round-headed windows to reception room and the round-arched entrance door do not harmonize well with the rest of the design, introducing a rather jarring note.

"KENILWORTH."—(Plan)—The radical defect of this plan is the access to the gymnasium. Short of going outside altogether, the only way to reach it is by going downstairs through the bicycle store-room and along a passage (with borrowed light) between lockers and baths. Nothing can rectify this. And there is not even an entrance to the gallery of the gymnasium from the billiard room. On the ground floor dining room with service pantry and kitchen are well arranged, there being a separate service entrance, but there is a lack of store-room accommodation. Hall and staircase are really cramped to provide the "den," which may be a desirable feature, but certainly is not worth sacrificing convenience for. A lavatory should have been provided on this floor; it would be needed in connection with the billiard room. On 1st floor the card rooms are also interfered with owing to the "den" downstairs, which has probably been one of those preconceived notions so apt to lead a designer astray when persevered in too devotedly. (Elevation)—Externally the design is unpretentious and good; rather timidly rendered.

"MARCUS".—(Plan)—The planning of the principal floor is decidedly weak. A lavatory that can only be reached from the billiard room by going through a card room is very badly planned. Upstairs a similar arrangement for the ladies' room is, of course, quite suitable and convenient. The kitchen on attic floor would hardly be workable at all in practice; it is destitute of proper facilities for storage, etc., and, situated in the midst of the members' bedrooms, would be a perpetual nuisance. (Elevation)—The elevation again is much better than the plan. It has no special character of a club about it, but is nevertheless fairly pleasing. The verandah or gallery would have been better (both for the plan and the elevation) had it been carried round the building on two sides; as designed it is too small. In this scheme bicycle accommodation is kept entirely separate from the house, an arrangement for which a good deal may be said.

"MAYFLY".—(Plan)—This design has a very good plan indeed in many respects. On ground floor the entrance hall and staircase are better arranged than in any other; cloak room and lavatory are well placed, the office is convenient, and the dining room is quite satisfactorily arranged with the pantry and kitchen en suite, the service entrance and staircase being adjacent; the latter would, however, be rather dark. Both gymnasium and billiard room are very well placed, although the latter is much smaller than the requirements of the programme. On the basement floor bathrooms and lockers, etc., are reached by a separate stair from the gymnasium, and accommodation for bicycles is convenient. On 1st floor the caretaker's house is kept quite separate with its own access stair. In the club portion, the only accommodation for ladies is reached through the reading room and music room, an arrangement very far from satisfactory. This is certainly the chief defect of the design. (Elevation)—The elevations are only fairly good, the east side being sadly dull.

"SPES.,'—(Plan)—In this design the gymnasium is on the top floor. In such an arrangement it was essential to provide good access to it, but precisely in this respect the planning is most faulty. To reach the gymnasium, members would have to go up the principal stairs to the 1st floor, then proceed along the passage straight towards the service stair, only to turn abruptly aside in search of the actual stairs leading up to the floor above, which are anything but suitably placed. As planned, the drawing room would surely be more suitable for the cafe than the room actually assigned to this, service to which would be very involved and awkward. Ladies' accommodation is provided, a separate billard room being included for them, but there is no lavatory accommodation for them at all; and billiard room and reception room reserved for the ladies' use are very inconveniently separated. (Elevation)—The exterior is shown in a boldly drawn and pleasing perspective. The design is good, perhaps the most satisfactory of all sent in. The gallery is ample, so that the little extra verandah facing north (and commanded by the toilet room) might well have been omitted in plan.

"VADIS."—(Plan)—This design makes no provision for refreshments at all, and therefore fails to comply with the conditions of competition. The general scheme is naturally on a somewhat smaller scale, though accommodation is provided for ladies on the first floor. A caretaker's house is also provided; but the caretaker, to come inside the club house, has to go out of doors and ascend the verandah to the front door, a very circuitous route. The plan, however, contains one arrangement that is well worth noting. The bowling alley, a very noisy accompaniment to club life, is here relegated to a separate building, entered off the gymnasium. Covered accommodation for bicycles is much too limited for a club specially devoted to cycling. (Elevation)—The exterior is rather fussy in design, with a somewhat pretentious bay window; but it has a certain character of its own suitable to a club and therefore satisfactory.

Cottage at Weston, Ont.—Sketched by A. H. Howard.

THE SCHOOL ART LEAGUE MOVEMENT.

The Art League movement in Toronto really started with the opening of the Rosedale school in 1896. Mr. Hughes spoke at the time of the art influence in decoration, and referred to the organization in other countries devoted to the improvement of school room decoration. The need of this work being so apparent, the ladies of the district organized a league for the purpose of carrying out this object in the Rosedale school. Money was raised for the scheme by concerts, lectures, etc.

After much active work the members of the league realized that expert advice would be necessary in order to judiciously spend the money which had been collected. With that in view a deputation of the Rosedale League waited on the Ontario Society of Artists, and requested it to co-operate with them in the matter. The result of this meeting was that in December, 1898, an Advisory Board was appointed, consisting of four architects, four artists and four lay members, an equal number of each elected by the Ontario Society of Artists and the Toronto Guild of Civic Art. In addition to these active members, four ex-officio members were appointed—the Mayor of Toronto, the Minister of Education, the Chairman of the Public School Board and the Inspector of Public Schools.

At the first meeting of the Board, held in the Education Department early in January, 1899, when Honourable G. W. Ross, then Minister of Education, was present, Mr. J. L. Hughes, Inspector, was elected Chairman and Mr. C. H. Acton Bond was elected Secretary. The Superintendent of Public School Buildings was added as an ex-officio member, and the Woman's Art Association of Canada was asked to appoint three active members. At this meeting the Honourable G.W. Ross offered to have printed and distributed to every school in the province, at the cost of the Government, a pamphlet setting forth the objects of the art leagues, their methods of working, and a suitable list of reproductions of the great pictures of the world, architectural photographs and good plaster casts. This pamphlet the Advisory Board has since prepared and it has been printed and distributed. Other work which the Advisory Board has already done is the preparation of a scheme for the redecoration of the kindergarten room at Rosedale school and supervising its execution. At present the Board is engaged in preparing schemes for decoration of the new rooms which will be added to various schools throughout the city this year, and also is preparing a report to present to the Minister of Education on the teaching of drawing in the public schools. This gives an idea of what the work of the Board is, and what the Board is prepared to do, and the advisory relationship it bears towards the art leagues in general.

When more leagues have been formed, it is proposed that a central league shall be organized, governing, to some extent, all the branch leagues. This will in no way interfere with the work of the Advisory Board, which has nothing at all to do with the governing of the leagues.

It will be seen that by this organization economy of effort and quick results will be gained, as each school getting advice from a board of experts which is continually accumulating experience in this particular branch of work, must be greatly benefitted, and the work of the art leagues will be done more economically, more thoroughly, and the ultimate results more quickly gained.

The following is a list of the present Board: Ex-officio members: The Minister of Education, the Mayor of Toronto, the Chairman of the Public School Board, the Superintendent of School Buildings, the Inspector of Public Schools. Representatives appointed by the Art Organizations:—Toronto Guild of Civic Art—A. J. Sommerville, E. F. B. Johnston, E. Wyly Grier, F. S. Challener, Frank Darling, W. A. Langton. Ontario Society of Artists—R. Y. Ellis, Arthur Cox, Eden Smith, C. H. Acton Bond, Gustave Hahn, G. A. Reid. Woman's Art Association of Canada—Mrs. Dignam, Miss Laura Muntz, Mrs. Hemsted.

NOTES ON METALS.

BY J. RAWSON GARDNER.

IN view of the general interest now being taken in Canadian mines and in the development of the mineral resources of this country, the following notes on some well known metals will no doubt be of value. It is well at times to compare what is being done in Canada with the work that is going on in other countries, and with this object in view certain statistical tables will be quoted—by this means the reader will be able to see at a glance where Canadians stand in comparison with other nations, and thereby gain a truer and more correct idea of the situation.

Let us take, then, for our subject the following five metals: Iron, copper, lead, zinc and tin.

1.—IRON.

This constitutes in its various forms of cast and wrought iron and steel one of the most important materials from an engineer's or architect's point of view. The ore is well distributed and is generally found as red or brown heamatite, magnetite or carbonate, the red haematite variety being mostly mined. The production of iron ore in the United States under these headings for the years 1889, 1893 and 1897 were as follows:

Year.	Red Haematite.	Brown Haematite.	Magnetite.	Carbonate.
1889.....	9,056,289	2,523,087	2,506,415	432,251 tons
1893.....	8,272,637	1,849,272	1,330,886	134,834 "
1897.....	14,413,318	1,961,954	1,059,479	83,295 "

The chief producing states in 1897 were:

Michigan.....	6,087,463 long tons.
Minnesota.....	5,601,429 "
Alabama.....	2,098,621 "
All others.....	3,730,533 "
	17,518,046

This iron ore was converted into pig iron and steel chiefly in Pennsylvania, Ohio and Alabama. In the last 20 years the world's production of pig iron has increased from slightly over 14 million tons to nearly 33 million tons, while the steel production has increased even more rapidly, only 3 million tons being produced in 1878,

while in 1897 21 million tons were turned out. The figures are as follows :

In 1897.	Pig Iron.	Steel.
United States	9,652,680	7,156,957
Great Britain	8,789,455	4,585,961
Germany and Luxemburg	6,879,541	5,119,300
All Others	7,615,814	4,157,643
	32,937,490	21,019,861

A writer in a recent number of The Spectator stated that he considered Germany was in more dread of the United States as a commercial competitor than Great Britain. This statement is borne out somewhat by the above figures as the iron market has oftentimes been called the barometer of trade. These notes on the iron industry will no doubt be of special interest at the present time when Canadians are looking forward to the day when the large iron and steel works at Sydney, Cape Breton, will be turning out over 300,000 tons of pig iron annually. The whole of Canada only produced 53,000 tons of pig iron and 18,000 tons of steel in 1897, so that one can judge from these figures the importance to Canada of this enterprise. Canadians will no doubt be proud that their own country will then be able to supply her mills with pig iron instead of being obliged as at present, to look to others for the supply of this most important material.

II.—COPPER.

This metal is very widely distributed, rich deposits having been found in various parts of the world. It is generally obtained from its ore by what is known as the dry or pyro metallurgical method, that is, if containing more than 4% of copper. When the ore contains under this amount it is usually obtained by the hydro metallurgical or wet method. The dry process is the one usually employed, and consists of roasting, calcining and refining, as many as 6 and oftentimes 11 different processes being gone through to convert the ore into good copper.

Copper is found in a few cases in the metallic state (when it is termed "native copper") but more often in some combination of oxides, sulphides or carbonates. The yellow sulphide commonly known as "pyrites" being probably the most common. The world's production of this metal for 1889, 1893 and 1897 was as follows :

Europe	81,613	88,922	88,828
North America	110,674	158,553	239,679
South America	31,983	27,220	25,300
Asia	16,125	18,000	23,000
Australia	11,582	6,667	17,322
Africa	7,860	6,090	7,440
	259,837	305,452	401,569

This table clearly shows that North America has nearly 60% of the world's production to her credit while the table following shows that the United States alone has over 50% of the world's product of copper :

United States	220,571 tons.
Canada	5,938 "
Newfoundland	1,800 "
Mexico	11,370 "
Total North America	239,679

The chief districts in the United States where copper ore is found are Montana, Lake Superior district and Arizona. The chief foreign producer is Spain, the world famed Rio Tinto mine alone producing in 1897 nearly 34,000 tons of copper.

III.—LEAD.

There is but one ore of lead that is of any commercia mportance, the sulphide (Pb. S.) which is more commonly known as galena. It is usually associated in greater or less quantities with silver, and when the silver is in paying quantities the ore is generally termed argentiferous galena. The silver is not hard to separate and when over 3 oz. to the ton is generally separated. The theory of smelting lead is as follows : The sulphide is converted into either the oxide or sulphate and then fused with a quantity of unchanged ore which yields metallic lead and sulphurous acid.

Galena is well distributed, the chief producing countries being the United States, Germany, Mexico and Great Britain, in the order mentioned. The United States produced in 1897, 192,000 tons, while Spain, the next largest producer, turned out 170,000 tons. Canada had 17,700 tons to her credit, being eighth in the list of lead producing countries. Iron plates coated with an amalgam of lead are called terne plates.

IV.—ZINC.

Zinc is usually obtained from either the sulphide when it is called blende, or from the carbonate when it is termed calamine. Metallic zinc when made into cakes or ingots is known in commerce as spelter. The ore is first crushed or ground and washed, then calcined in a reverbatory furnace, afterwards going through a series of retorts for reduction purposes. Zinc having the exceptional property of being readily volatile at the temperature of its reduction, it is necessary therefore that this operation should be carried on in some form of retort and the zinc obtained as a distillate.

Zinc is capable of being rolled at a temperature of 100° to 150° C. into very thin sheets. At a temperature of 200°C. the metal becomes brittle and capable of being pounded in a mortar. At 415°C. it fuses, and at 1040° C. it boils. The chief producing countries are : Belgium, Silesia, Germany and the United States, the Vielle Montague Company, of Belgium, being the largest single producer, turning out in 1897 over 68,000 tons of crude zinc. Great care should be taken in using zinc to see that it is perfectly pure as in the event of its containing iron it will not resist the action of the atmosphere. The expansion is greater than in other metals, which is the chief drawback to a larger use of this material.

Expansion of Zinc	=.0030
" Lead	=.0028
" Tin	=.0024
" Copper	=.0017
" Iron	=.0011

It is chiefly for this reason that zinc has been used as a coating for iron plates, which have been called erroneously, galvanized iron.

V.—TIN.

This metal, in contradistinction to the other four above mentioned, is very sparsely distributed, the chief countries producing tin being Great Britain (almost entirely in Cornwall), Straits Settlements and Australia. The ore is found in veins or layers within the older crystalline rocks and slates. It often also presents itself in loose crystals in the sandy beds of rivers, having been washed away from its matrix, and is then called stream tin. It is used extensively in the process of tinning iron plates which has of late become quite an extensive branch of the iron trade. There were, in the year 1897, 69 tin plate establishments in the United States alone. No deposits of tin of commercial importance have, however, so far been discovered in either the United States or Canada, and the tin used in the manufacture of these plates is all imported.

Temple Building, Montreal, March, 1900.

Meadowvale, Ont.—Sketched by A. A. Martin.

APPLIED ART.

By G. A. Reid, R.C.A., President Ontario Society of Artists.

The Exhibition of Applied Art now being organized by the Ontario Society of Artists, is undertaken in the hope of aiding the movement which has shown signs of growth in Toronto. It is intended to show also that the artists who are usually thought of as painters of pictures which may sometime find a temporary and possibly an inappropriate place on the walls of a private residence or museum, are not satisfied to occupy such a narrow groove in the world of art, but instead are chafing under the limitations of the position they are supposed to occupy, and are fully aware of the debased condition of art about them. They know that the architect, sculptor, and painter should work hand in hand to produce true architecture, which is only worthy of the name when it is so treated. They understand that without the artist artisan all art fails, and it is with dismay that they see him reduced to little more than a machine.

The Society of Artists therefore are desirous of placing themselves on record as being in sympathy with the wide movement which has for its object the reunion of the arts now so disassociated. Though there are those who cannot see how reform can come to the arts except by a return to pure handicraft, and only handwork seems to them worth being called artistic, there are others and probably they are the most philosophical and enlightened, who think that the art of every age should work in its own way as directed by conditions; thus the machine should be utilized, but not recklessly as has been the case during the last hundred years.

It is to be hoped that the riot of invention which has possessed us will soon have spent itself and that we will soon be able to judge of the respective values of the work of the machine and the hand and so reap the true advantage of the labor saving device. To make such an estimate requires perhaps a very different education and environment than now exists, but we must form our ideals and approximate our actions to them whatever the impossibility may be of reaching them.

Before the advent of steam power, there were many plans whereby the workman by this and that mechanical means aided his hand and supplemented mere brute strength to multiply his power to produce. We have only to think a moment to call to mind many such labor saving devices, and to recognize in them the first steps to the multitude of forms which we see in the machines of to-day.

Hand and foot power, horse power, wind and water power, have been largely supplanted by that steadier and more powerful motor, steam, and that is now being driven out by more subtle forces yet. To what extent rapid increase of power may go no one is now prepared to make assertion, though there is much speculation.

The steam age has existed about one hundred years and the revolution in the processes of production during that period, it is safe to say, has never in the world's history been paralleled; the statement might be made in fact, and find no intelligent contradiction, that no period of ten times the duration has seen as great a change.

To realize what such a revolution means taking place in what may be termed a life-time, we only need to picture the workman of the last century busy making with the aid of his hand and foot power machines and tools, a complete article, the design of which and its embellishment progressed as it grew, and to glance at the typical workman of to-day keeping time to the beats of a machine as a minute piece of a complete article gets advanced a step in its progress to being a completed part.

The first picture is that of an artist artisan of whom there are only a few isolated examples now in existence, and the second is that of a mechanical drudge whose work debases him and saps his life by its monotony and lack of interest for him.

The power to repeat with ease and great rapidity elaborate forms which give a show of wealth when the mechanical device first appeared, could not be otherwise than alluring to the people heedless to what it would lead, and the law of supply and demand was inexorable so that a rapid degradation and decline of the arts was the consequence.

Naturally, those who recognize the value of the plastic arts to a people have been plunged into despair as they have realized the constantly increasing domination of machine-made work over that made by hand and the consequent loss of individuality in design and workmanship in every field of art activity, and all over the civilized world many crusaders are now working, trying to stem the tide or to turn its power to account.

Arts and crafts exhibitions are one of the evidences of this widespread movement, and the intention of these exhibitions is to make all the people realize the value of work of beautiful design and craftsmanship, and to thus create a demand which would move the manufacturer to supply. This may seem hopeless to some on account of associating great cost with the beautiful building, piece of furniture, utensil, or other objects of art, but this is far from the right idea. A return to simplicity and sincerity of intention is the central purpose, and the idea that to insure the production of a beautiful thing the worker must experience a joy and delight in producing it, is coming to be recognized. The best systems of education now are stimulating the power to initiate and the time is at hand where wise manufacturers will use the initiative power of the workman as the basis of profit, instead of taking so much cognizance of mere whimsical demand.

A DECORATIVE HINT.

An excellent decorative effect has been obtained in the carriage driveway of the Bach Bay Station, in Boston, by using a high wainscot of copper, carrying out the lines of the oak vertical boarding with V-shaped joints that is employed for lining the upper part of the walls. No molding is used to break the joint between the copper and the wood, the whole effect being obtained by the difference in color. The same treatment obtains both on the walls and on the heavy circular columns that carry the roof.

while in 1897 21 million tons were turned out. The figures are as follows :

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All Others	7,615,814	4,157,643
	32,937,490	21,019,861

A writer in a recent number of The Spectator stated that he considered Germany was in more dread of the United States as a commercial competitor than Great Britain. This statement is borne out somewhat by the above figures as the iron market has ottentimes been called the barometer of trade. These notes on the iron industry will no doubt be of special interest at the present time when Canadians are looking forward to the day when the large iron and steel works at Sydney, Cape Breton, will be turning out over 300,000 tons of pig iron annually. The whole of Canada only produced 53,000 tons of pig iron and 18,000 tons of steel in 1897, so that one can judge from these figures the importance to Canada of this enterprise. Canadians will no doubt be proud that their own country will then be able to supply her mills with pig iron instead of being obliged as at present, to look to others for the supply of this most important material.

II.—COPPER.

This metal is very widely distributed, rich deposits having been found in various parts of the world. It is generally obtained from its ore by what is known as the dry or pyro metallurgical method, that is, if containing more than 4% of copper. When the ore contains under this amount it is usually obtained by the hydro metallurgical or wet method. The dry process is the one usually employed, and consists of roasting, calcining and refining, as many as 6 and oftentimes 11 different processes being gone through to convert the ore into good copper.

Copper is found in a few cases in the metallic state (when it is termed "native copper") but more often in some combination of oxides, sulphides or carbonates. The yellow sulphide commonly known as "pyrites" being probably the most common. The world's production of this metal for 1889, 1893 and 1897 was as follows :

Europe	81,613	88,922	88,828
North America	110,674	158,553	239,679
South America	31,983	27,220	25,300
Asia	16,125	18,000	23,000
Australia	11,582	6,667	17,322
Africa	7,860	6,090	7,440
	259,837	305,452	401,569

This table clearly shows that North America has nearly 60% of the world's production to her credit while the table following shows that the United States alone has over 50% of the world's product of copper :

United States	220,571 tons.
Canada	5,938 "
Newfoundland	1,800 "
Mexico	11,370 "
Total North America	239,679

The chief districts in the United States where copper ore is found are Montana, Lake Superior district and Arizona. The chief foreign producer is Spain, the world famed Rio Tinto mine alone producing in 1897 nearly 34,000 tons of copper.

III.—LEAD.

There is but one ore of lead that is of any commercial importance, the sulphide (Pb. S.) which is more commonly known as galena. It is usually associated in greater or less quantities with silver, and when the silver is in paying quantities the ore is generally termed argentiferous galena. The silver is not hard to separate and when over 3 oz. to the ton is generally separated. The theory of smelting lead is as follows : The sulphide is converted into either the oxide or sulphate and then fused with a quantity of unchanged ore which yields metallic lead and sulphurous acid.

Galena is well distributed, the chief producing countries being the United States, Germany, Mexico and Great Britain, in the order mentioned. The United States produced in 1897, 192,000 tons, while Spain, the next largest producer, turned out 170,000 tons. Canada had 17,700 tons to her credit, being eighth in the list of lead producing countries. Iron plates coated with an amalgam of lead are called terne plates.

IV.—ZINC.

Zinc is usually obtained from either the sulphide when it is called blende, or from the carbonate when it is termed calamine. Metallic zinc when made into cakes or ingots is known in commerce as spelter. The ore is first crushed or ground and washed, then calcined in a reverbatory furnace, afterwards going through a series of retorts for reduction purposes. Zinc having the exceptional property of being readily volatile at the temperature of its reduction, it is necessary therefore that this operation should be carried on in some form of retort and the zinc obtained as a distillate.

Zinc is capable of being rolled at a temperature of 100° to 150° C. into very thin sheets. At a temperature of 200°C. the metal becomes brittle and capable of being pounded in a mortar. At 415°C. it fuses, and at 1040° C. it boils. The chief producing countries are : Belgium, Silesia, Germany and the United States, the Vielle Montague Company, of Belgium, being the largest single producer, turning out in 1897 over 68,000 tons of crude zinc. Great care should be taken in using zinc to see that it is perfectly pure as in the event of its containing iron it will not resist the action of the atmosphere. The expansion is greater than in other metals, which is the chief drawback to a larger use of this material.

Expansion of Zinc	.0030
" Lead	.0028
" Tin	.0024
" Copper	.0017
" Iron	.0011

It is chiefly for this reason that zinc has been used as a coating for iron plates, which have been called erroneously, galvanized iron.

V.—TIN.

This metal, in contradistinction to the other four above mentioned, is very sparsely distributed, the chief countries producing tin being Great Britain (almost entirely in Cornwall), Straits Settlements and Australia. The ore is found in veins or layers within the older crystalline rocks and slates. It often also presents itself in loose crystals in the sandy beds of rivers, having been washed away from its matrix, and is then called stream tin. It is used extensively in the process of tinning iron plates which has of late become quite an extensive branch of the iron trade. There were, in the year 1897, 69 tin plate establishments in the United States alone. No deposits of tin of commercial importance have, however, so far been discovered in either the United States or Canada, and the tin used in the manufacture of these plates is all imported.

Temple Building, Montreal, March, 1900.

Meadowvale, Ont.—Sketched by A. A. Martin.

APPLIED ART.

By G. A. Reid, R.C.A., President Ontario Society of Artists.

The Exhibition of Applied Art now being organized by the Ontario Society of Artists, is undertaken in the hope of aiding the movement which has shown signs of growth in Toronto. It is intended to show also that the artists who are usually thought of as painters of pictures which may sometime find a temporary and possibly an inappropriate place on the walls of a private residence or museum, are not satisfied to occupy such a narrow groove in the world of art, but instead are chafing under the limitations of the position they are supposed to occupy, and are fully aware of the debased condition of art about them. They know that the architect, sculptor, and painter should work hand in hand to produce true architecture, which is only worthy of the name when it is so treated. They understand that without the artist artisan all art fails, and it is with dismay that they see him reduced to little more than a machine.

The Society of Artists therefore are desirous of placing themselves on record as being in sympathy with the wide movement which has for its object the reunion of the arts now so disassociated. Though there are those who cannot see how reform can come to the arts except by a return to pure handicraft, and only handwork seems to them worth being called artistic, there are others and probably they are the most philosophical and enlightened, who think that the art of every age should work in its own way as directed by conditions; thus the machine should be utilized, but not recklessly as has been the case during the last hundred years.

It is to be hoped that the riot of invention which has possessed us will soon have spent itself and that we will soon be able to judge of the respective values of the work of the machine and the hand and so reap the true advantage of the labor saving device. To make such an estimate requires perhaps a very different education and environment than now exists, but we must form our ideals and approximate our actions to them whatever the impossibility may be of reaching them.

Before the advent of steam power, there were many plans whereby the workman by this and that mechanical means aided his hand and supplemented mere brute strength to multiply his power to produce. We have only to think a moment to call to mind many such labor saving devices, and to recognize in them the first steps to the multitude of forms which we see in the machines of to-day.

Hand and foot power, horse power, wind and water power, have been largely supplanted by that steadier and more powerful motor, steam, and that is now being driven out by more subtle forces yet. To what extent rapid increase of power may go no one is now prepared to make assertion, though there is much speculation.

The steam age has existed about one hundred years and the revolution in the processes of production during that period, it is safe to say, has never in the world's history been paralleled; the statement might be made in fact, and find no intelligent contradiction, that no period of ten times the duration has seen as great a change.

To realize what such a revolution means taking place in what may be termed a life-time, we only need to picture the workman of the last century busy making with the aid of his hand and foot power machines and tools, a complete article, the design of which and its embellishment progressed as it grew, and to glance at the typical workman of to-day keeping time to the beats of a machine as a minute piece of a complete article gets advanced a step in its progress to being a completed part.

The first picture is that of an artist artisan of whom there are only a few isolated examples now in existence, and the second is that of a mechanical drudge whose work debases him and saps his life by its monotony and lack of interest for him.

The power to repeat with ease and great rapidity elaborate forms which give a show of wealth when the mechanical device first appeared, could not be otherwise than alluring to the people heedless to what it would lead, and the law of supply and demand was inexorable so that a rapid degradation and decline of the arts was the consequence.

Naturally, those who recognize the value of the plastic arts to a people have been plunged into despair as they have realized the constantly increasing domination of machine-made work over that made by hand and the consequent loss of individuality in design and workmanship in every field of art activity, and all over the civilized world many crusaders are now working, trying to stem the tide or to turn its power to account.

Arts and crafts exhibitions are one of the evidences of this widespread movement, and the intention of these exhibitions is to make all the people realize the value of work of beautiful design and craftsmanship, and to thus create a demand which would move the manufacturer to supply. This may seem hopeless to some on account of associating great cost with the beautiful building, piece of furniture, utensil, or other objects of art, but this is far from the right idea. A return to simplicity and sincerity of intention is the central purpose, and the idea that to insure the production of a beautiful thing the worker must experience a joy and delight in producing it, is coming to be recognized. The best systems of education now are stimulating the power to initiate and the time is at hand where wise manufacturers will use the initiative power of the workman as the basis of profit, instead of taking so much cognizance of mere whimsical demand.

A DECORATIVE HINT.

An excellent decorative effect has been obtained in the carriage driveway of the Bach Bay Station, in Boston, by using a high wainscot of copper, carrying out the lines of the oak vertical boarding with V-shaped joints that is employed for lining the upper part of the walls. No molding is used to break the joint between the copper and the wood, the whole effect being obtained by the difference in color. The same treatment obtains both on the walls and on the heavy circular columns that carry the roof.

COMPETITIONS IN MONTREAL.

By "Polnud."

These are invariably of a character that architects of any professional standing can hardly enter with safety, and always with a surety of loss, for it is the best lobbyiest who secures the prize in the end, and though he may have a good design and the ability to construct a creditable building, it is his influence as a churchman, or the enmity of a certain member on the committee to the other competitors, and not his ability as an architect, that wins. Under this condition of things the best architects do not compete, and those who have a professional name to make and a fortune to acquire, enter them only so far as they feel some hope of success, and leave them when other work brings more lucrative employment. On the other hand in England, France and Germany, the conditions are vastly different. They have a past to commemorate and an accumulated wealth to invest, and the architect works for glory, being assured when he competes for a structure of importance that his chances are all based upon his ability to design; and once asked to enter such a competition, he feels confident of fair play, and his design being placed first, no party or petty spite is allowed to wrest from him what he has fairly won by his genius. We should not despair of seeing a like condition of things in this country. A few such successful competitions as this would have a vast influence; a new generation will come with advanced ideas upon art, and while a new style will be a matter of formation for generations and its perfection only to be found in the decadence of a nation, still each bright mind in the profession will seek to better that which exists.

Two conditions always necessary are :

The successful designer should as a matter of course be employed to carry out his design at regular prices; competition as regards rates of compensation would necessarily be demoralizing to the competitors, and possibly to the judgment of the committee.

While it is in accordance with the extremely mercantile spirit of the age to endeavor to obtain the maximum of value for the minimum of payment, yet such a principle applied to artistic work has a most depressing effect on talent, fails to call out high ideas and drives eminent practitioners entirely away.

The best way to secure a keen and good competition is to name and pay (enough for expenses) a certain number of leading architects, and allow all others to come into the competition without pay but a fair and just chance of winning the prize should their plan take first place. There is nothing individious in the choice ; all architects not named would know that a want of influence on the Board was the cause of their being left out.

This is where the members of the Province of Quebec Association of architects could be benefitted, as all members in good standing should be invited to compete on all public buildings, viz., government, municipal schools, libraries, hospitals, and public charitable buildings. I can plainly see unless some compensation as well as glory is derived from the Association it will dwindle away and members will resign and practice as do the aliens and outsiders without its benefits and protection.

This, after all the devotion and labor of the first originators of the Association would indeed be a serious calamity, as no branch of the professions should be more protected in an educational sense than Architecture, as it is the most important of all professions, affecting as it does the health, comfort, safety, and the beauty and wealth of all cities. No doubt the Association has accomplished a great deal, and through the generosity of the founder of a chair of architecture in McGill by Sir W. McDonald. This important achievement will be a great incentive to the profession and the better education of architects will be a certain surety to the public that architects will at least understand the construction of a building if they are not all geniuses and endowed with artistic ability. The architecture of our city will be improved ; the comfort of our inhabitants will be increased ; the revenue will be augmented ; the daily travel to our beautiful cities be tripled ; and the prosperity of our people assured. This is all very encouraging, and our young men are led to believe that all is accomplished for their future prosperity when they have become members of the Association. The public, however, looks for one great essential in our architects, competency, and nothing but the real article will suffice. An architect in these days must prove that he possesses distinct knowledge of building, that he is a better constructor, better sanitarian, better artist, than a builder merely — that his scientific knowledge of mechanics, of the properties of matter, the laws of heat, light and sound, of chemistry and hygiene, are so far complete that he can advise on buildings for all purposes ; specify works of drainage and ventilation ; he must know sufficient law to protect his client from all possible risks, and all this in addition to his art training and artistic capabilities. It is such a competence that can only be proved in actual works designed, and executed by him, that the public demand for the five per cent.—not a mere theoretical knowledge that may do very well for a graduate of McGill or a member of the architects association. The titles bestowed by these two ought to imply a distinctively competent man as I have sketched, and should only be bestowed on those who have actually carried out designs of their own ; but alas ! the titles are won by men of very indifferent attainments, and whose rank as artists may be impeached in many cases. The examinations have unquestionably raised the meaning and standing of members in many instances, but they are of a much too general and perfunctory kind to guarantee the architect's ability. When a diploma or letters bestowed on an architect can actually mean that he is above his fellows, then will the public begin to realize the value of these distinctions, and not before. No system of questions and answers will ever test the actual ability of an architect in his two fold functions of an efficient builder and skillful designer. The public also have a suspicion of anything like cliqueism, and those who form themselves into societies and combinations have generally a reputation (ill founded in most cases) of trying to serve their own ends, and the charge of trade unionism is often brought against professional bodies. It is for the professions to show the unreasonableness of the charge by proving that their interests are the public's interests. The building public ask for competent men able to design and carry out well constructed and sanitary buildings. They want to have proof of that competence by some guarantee that a building will be more efficient when an architect is employed than when he is not, and the Association should strive to prove to this doubting public that the degree conferred on any member by the Association and sanctioned by the legislature (as it is) should be guarantee of the highest standard of professional attainments.

BRITISH COLUMBIA LETTER.

No. III.

The want of places of amusement and resort in the towns of British Columbia is very noticeable, and is found not only in the new but in the old towns as well ; Vancouver possesses an opera house with excellent appointments, but beyond this and a couple of small music halls of scarcely questionable character, there is nothing ; there are no assembly rooms, neither is there a choral hall, or for that matter any hall whatsoever of a public character ; the so-called city hall is merely an indifferent bad market place, converted by somewhat primitive means into a series of rooms that remind one rather of loose boxes for the accommodation of the civic officers and staffs, the building having proved a failure in its original business ; exclusive of the opera house, there is no place in which a great meeting of the citizens can be held, and curiously enough, the need of such a place does not appear to be recognized.

The public free library, though recently greatly improved, does not compare favorably with similar institutions in other places of equal importance ; there is no art gallery, museum of any sort, art or technical schools.

In Victoria we find a small natural history museum housed in the provincial government buildings and under the control of the agricultural department, so Victoria can scarcely claim an undivided interest in this, her only jewel of the description, for in other points the capital is certainly no better provided than is her younger and less wealty sister on the mainland.

The British Columbian public, while claiming to be an advanced and go ahead community, betrays a strangely complete indifference to matters of this sort. The explanation offered is the well worn one always trotted out when one ventures to criticise anything on this continent, "we are so young, you know." But this tiresome cant falls to the ground if comparisons be instituted between these and other very young and far more remote places ; it is obviously unfair to compare little towns such as Victoria, Vancouver, New Westminster and Nanaimo with places of the same size in England, Germany or France for instance, or with the Australian towns of similar importance, but either Tasmania or New Zealand may fairly be said to have enjoyed no advantages of age or proximity to great and wealthy communities over these British Columbian places ; in New Zealand we find every town whose inhabitants number more than a very few thousands is fairly well provided with museums, art gallery, art schools, public library and town hall, each of these being more or less well equipped with collections of the different descriptions, for the possession of which the people are usually in the main more indebted to the patriotic generosity of private individuals who laid the foundations of these invaluable institutions in the earliest days of that distant colony than to the wisdom of their elected rulers ; nothing has yet been done on these lines for any town in this province, old or new. The people of both Auckland and Christchurch possess priceless collections of native weapons, implements, carving and so forth, good, useful collections of pictures, which include many works by famous men of the past as well as of the present ; these and other treasures, such as blackletter bibles (there are no fewer than six Caxtons in Auckland), blackletter books, illuminated missals and manuscripts, examples of wood engraving, cutting and printing, prints, etchings, painting on ivory and china, sculptures, coins, bronzes, and so on—in Auckland these are housed in a building, the cost of which, amounting to nearly $150,000 without the site, was the posthumous gift of one man ; the late Sir George Grey, the famous pro-consul, donated his magnificent private library and works of art, together valued at $400,000, to the same city during his life time, and a Dr. McKelvie established a fund which provides something like $6,000 annually for the purchase of British paintings ; the Auckland Art Society's annual exhibition is one of the social events of each season ; the public library, too, is splendidly equipped and maintained. Contrast this with the state of affairs in Victoria, which is of the same age as Auckland, or with Vancouver, which will probably soon have as large a population. In New Zealand we see a keen appreciation of the educational value of museums, galleries, art schools and public libraries; here we find their absence or inadequacy scarcely known or noticed ! Possibly the only work of art (save the mark!) which the people of Vancouver may claim to be their very own is the galvanized iron travesty of a blind-folded Justice soldered to the summit of the tin dome of that arch architectural caricature, the Courts of Justice.

The Arts, Historical and Scientific Association of Vancouver appears to have enjoyed a successful season during 1899. The membership numbers 51, nine meetings were held during the year exclusive of 5 public meetings, the attendance at which, however, was not very large. On February 9th Rev. L. Norman Tucker read a paper on "Historical Quebec"; on March 9th one on "Canadian Poetry" was given by Ven. Archdeacon Pentrath; a musical program was rendered on the 11th April; a conversazione was held on October 10th; Rev. Prof. Whittington delivered a lecture, illustrated by diagrams and maps, on "700 Years of Work and Wages in England."

Numerous additions to the collection of the Association have to be recorded, notably some specimens of Roman pavement presented by Miss Kilby, and a number of photographs of Egypt, Constantinople and Athens, of Greek architecture, and of Italian works of art, all presented by Madame A. Aalberg.

During the year the museum bas been reduced to order, everything having been labelled by a sub-committee. The financial statement shows a balance to the good of $77, and the city made a grant of $100. The secretary, W. H. J. de Forest, expresses in his annual report a hope that a more suitable house for the Association may soon be found in connection with the free public library.

The Association appears to devote little attention to the arts, probably because it is found that things historical and scientific embrace a sufficiently wide domain. Owing to the lack of a public art gallery, we are precluded from receiving the benefit of even the briefest intercourse with any painters, architects or other artists who may visit our city for a few days. Those painters who sojourn with us for a season and wish to exhibit their works have to do so in a manner which is wholly unsatisfactory. Quite recently a Royal Canadian Academician was indebted to the courtesy of a druggist for permission to exhibit his sketches of the coast among the tooth brushes and sponges displayed in the store window. Another well known R. C. Academician showed his paintings in a store devoted to photography and picture frames, certainly a more appropriate place than the other, but it is not creditable to a city of 35,000 inhabitants that it should not possess a salon, studio, or even a suitable room to place at the disposal of visitors more or less distinguished in the world of art. Our city fathers appear to be too deeply immersed in acrimonious personal disputes or in the cares of ward politics to give much thought to such trifling matters as "painting and poetry," but surely if a fair proportion of the citizens are really of a higher intellectual level than the squabbling ones who usually run the city hall in these parts, the deficiencies noted would be quickly remedied ?

Sir L. Alma-Tadema, R.A., has emblazoned on the walls of his studio this device : "As the sun colors flowers, so art colors life." How little color then must there be in the vast majority of lives ! John Ruskin says "All great art is praise." We have a city full of churches, is it invidious to ask "where is the art ?" Echo would indeed answer, Where ?

Sedding, in a paper read before the Portsmouth Church Congress in 1886, thus replies to his own question, "What is Art ?" : "I answer, Art is the embodiment and communication of man's thoughts about man, nature and God. It is man's way of decorating his existence and of ministering to the glory of his Maker. Art is both the need of man's nature and its highest product ; art is, I say, a necessity of man's nature, it is his speech ; and ordinary speech, the utterance of his ordinary thoughts and emotions, is a necessity, so too is the utterance of his inspired thoughts and emotions, through the medium of art, a necessity. Look through the world's history and from beginning to end man is revealed as an artist, a promoter of art. . . . Art is man's speech in inspired moments, the voice of the imaginative qualities in individual or in race, a voice so tell-tale, so expressive in its manifestations, that the expert need not be told the origin of a piece of art brought to his notice, need not be told the land of its birth. Even if it be of remote antiquity it carries its mark, a type of form, a pattern that recalls dead symbols, a trick of handiwork by which its source is traced home, ... and in the art of a race we have not only its imaginative voice but the key to the dominant traits, the temperament, the conditions of the people."

Were the civilization of this country now to be abruptly terminated, in what estimation would the antiquarians of succeeding ages hold the "dominant traits, the temperament, the conditions of this people," as evidenced by their archaeological remains ? In spite of systems of electric trolley cars, of electric lighting, and of telephone communication (with their attendant forests of hideous poles), our "handsome," "solid," even "magnificent" blocks, as the ubiquitous reporter very modestly describes them,

our "splendid" galvanized iron statuary, our tons of "beautiful" metal cornices, our sham Gothic churches, with their wealth of stained glass, in which is revealed about as much power of design and thoughtful color as is found in a 10-cent kaliedoscope, all of these notwithstanding, it is greatly to be feared our learned critics would not place us very high on the scale of past civilizations. What indeed could the future Mr. Dryasdust find to say in favor of a people apparently so devoid of excellence in the practise of the Arts? Imagine how he would record his discovery of the entire absence of an art gallery, public hall, technical schools, of a library of reference, in the most modern and important town to be found in a distance of nearly 3,000 miles—his comments on a people content to worship in buildings which would not have reflected credit on the Vikings of Europe, who ran their race ten centuries before them, would probable be worth reading! Posterity would indeed find it hard to believe that Eastern and Western civilization were contemporary and linked by the superb engineering feats marking the trail of the iron road connecting the two extremes.

We are pleased to learn that steps are being taken towards the formation of an Arts and Crafts Society, based, we understand, upon similar lines to the now famous Arts and Crafts Society of London, founded by the late Mr. Wm. Morris, which has performed yeoman's service in the cause of restoring English Art to a national art, as opposed to a merely one man or individual art; the new society hopes to bring together all workers in metals, wood carvers, architectural sculptors, carvers, modellers, designers and workers in glass, furniture and fabrics, painters of china, wood engravers, professional and amateur photographers, and, in short, all sorts and conditions of men and women who regard their daily vocations as something higher than mere wage-earning drudgery. It is intended to enroll both working and honorary members, with a nominal subscription for the former and a higher one for the latter; the chief efforts of the society will at first be directed towards holding an annual exhibition to remain open to the public for some days, and an attempt will be made to encourage the sale of local productions by means of an art union. The honorary membership will carry with it admission to the Society's exhibition, the opening conversazione and the private view, and will also entitle the holder to certain chances in the Art Union. It is to be hoped that the enthusiastic promoters of this excellent scheme will meet with a full measure of success.

Had the craftsmen to whom our details have to be entrusted for execution enjoyed the opportunities for study and comparison which a properly constituted Arts and Crafts Society affords, we should be spared many of the errors in elementary good taste and in the proper fitness of things one so frequently meets with; even when the architect provides carefully studied details, which is far less frequently the case than should be, they are often misrepresented in execution by thoughtless artificer who puts but little life or pride into his work; the every day, machine-made artizan works primarily for wages. Wages, of course, must be earned, but if the worker could have instilled into him some appreciation of the art value of the molding, contour, or what not on which he is working, as well as of the texture of the material, his interest would be quickened and he would of necessity put more of his own soul and character into his execution; of most workmen it is the highest ambition to emulate the precision and neatness of a machine, and in this he is encouraged by a public which places a false view on mere exactness; upon being shewn a drawing the first comment of both the average workman and the every day layman is made upon the mechanical dexterity or draughtsmanship betrayed in its preparation; rarely indeed does either look beyond this point and seek for its real value, the knowledge and power shewn in its design and composition; it is not possible that character and feeling can be retained under such circumstances—one might as well expect to hear a soulful rendering of Beethoven's "Moonlight Sonata" ground out by a grinning Italian organ grinder and his appreciative monkey. The fault, too, lies heavy at the door of the every day architect, who takes about as much interest in the higher teaching of his vocation as does the man who tends the planing machine; with the former, commission is the first aim, with the latter, wages; in no true sense is one better than the other. Not long ago the architectural world in England was much exercised over the question of "Architecture a Profession or an Art?" Here it might be transposed, "Architecture a Business or a Trade?"

Advertising will sell everything that ought to be sold.—Bates.

ILLUSTRATIONS.

DINING HALL AND UPPER CORRIDOR IN ROYAL HOTEL, HAMILTON, ONT.—MR. W. P. WITTON, ARCHITECT.

EXTERIOR AND INTERIOR VIEWS, RESIDENCE OF MR. W. S. ANDREWS, ROSEDALE, TORONTO.—MESSRS. DARLING & PEARSON, ARCHITECTS.

THE MACDONALD CHEMISTRY AND MINING BUILDING, McGILL UNIVERSITY, MONTREAL.—ANDREW T. TAYLOR (TAYLOR & GORDON), ARCHITECT.

DRAWING TO HALF-INCH SCALE OF OFFICE BUILDING FOR MESSRS. LEVER BROS., LIMITED, TORONTO (SELECTED BY THE ARCHITECTS' EIGHTEEN CLUB, TORONTO)—SPROATT & ROLPH, ARCHITECTS.

CANADIAN ARCHITECT & BUILDER'S STUDENTS' COMPETITION FOR A SUBURBAN BICYCLE CLUB HOUSE.—DESIGN BY "KENILWORTH" (CLARENCE THEDFORD, 237 DUFFERIN STREET, TORONTO) AWARDED FIRST POSITION.—DESIGN BY "SPES" (WILLFORD A. GAGNON, 25 MELBOURNE AVENUE, WESTMOUNT, MONTREAL, QUE.,) AWARDED SECOND POSITION.—THIRD POSITION IN THIS COMPETITION HAS BEEN AWARDED TO THE AUTHOR OF THE DESIGN SIGNED "DINAH," FREDERICK C. FRENCH, 84 WELLESLEY STREET, TORONTO.)

FIGURING UP.

The following is given by the Illustrated Carpenter and Builder as a simple and rapid way of finding the number of joists, studs, furring, &c., for any given length of floor or walls, where the centres are placed 16 in. apart: Multiply the length of the building in feet by three, and divide the product by four. For instance, a building is 124 ft. long, then $124 \times 3 = 372 \div 4 = 93$, the number of joists or studs required. This rule holds good no matter what the thickness of joists may be, as long as they are spaced 16 in. from centre to centre. Allow one extra for a starter, except where a sill or other timber forms a starter. The same rule applies also to furring or stripping, or any other work, when 16 in. form the distances from centres. In estimating the number of rafters or other timbers that are set 2ft. 6in. to centres, results may readily be obtained by multiplying the length of building by two and dividing the amount by five. The result will show the number of pairs of rafters required, less one pair, which must be added. Again, if we want to place joists of timbers of any kind, 18in. from centres, all we have to do is to multiply the length in feet by two, and divide the product by three, pieces required less one, which must always be added. In the first instance the foot is divided into three parts of 4in. each, and in the two latter examples the foot is divided into two parts of 6in. each. The principle is quite plain, and, when properly understood, may be applied to many cases in estimating.

The Dominion Radiator Company has contributed $500 to the Canadian Patriotic Fund.

The introduction into New York of a mechanical bricklayer, which has been invented in England, has brought the leaders of the builders trades' unions face to face with a serious problem. The latter say they cannot stop the progress of machinery, but they will keep reducing the hours of labor as the introduction of machinery proceeds. The new machine will save two-thirds of the time occupied in laying bricks by hand.

THE NEED OF AN ART MUSEUM IN TORONTO.

The Ontario Society of Artists have had printed a brochure "On the Need for an Art Museum in Toronto and some Suggestions on how it might be founded." The introductory reads as follows:

The need of an Art Museum in Toronto has long been felt by those interested in the progress of Art in the city and province.

While in other branches of education Toronto takes a leading position, and suitable buildings have been erected for their accommodation, as regards Art it is far behind cities of its size and importance in the United States, Australia, New Zealand and Cape Colony.

Visitors are surprised at the absence, in a centre of education, of an appropriate home for the fine arts.

All art workers feel more and more the need of such an institution as a place of reference and comparison; and students of art also feel the lack of opportunities for study.

It is therefore considered that a great effort should now be made on a broad basis to found such an institution. The material for this pamphlet has been prepared and published in the hope of aiding the organization of an Art Museum Association in Toronto and of encouraging donations by citizens and corporations.

The nature and functions of an Art Museum are described and suggestions offered for the founding of an institution adapted to the requirements of Toronto, as follow:

An Art Museum should be regarded, first, as an educational institution, its power to delight and amuse being secondary to its instructive function. It should possess the historical aspect incidentally, and treat the history of art concisely with the best examples of the work of all periods, never exhibiting mere relics; therefore, the difference between an Art Museum and an Historical Museum must be kept distinct, though a close relation may exist.

Access should be so free for all that every man, woman and child of the community might be familiar with its contents. This, however, should be made compatible with the necessity of setting apart times for study by specialists and students. Free and pay days for the admission of the public would serve such a purpose.

A school of art and design should be in close connection with such an institution; the collection of works of fine and applied art serving as a storehouse for reference, and stimulating art activity of every sort. An enumeration of the leading sections will serve to show the vast importance of such a museum. There should be, as a matter of course, antiquities of all sorts, valuable as art productions; examples of sculpture, painting, architecture and textiles, and of work in metals, wood, and pottery.

These and other heads, when sub-divided, would cover a vast field of work which it is necessary for the student to see and examine to fully appreciate and emulate; and it is by the examination and contemplation of such works of art that the young are induced to undertake the development of their latent abilities.

An ideal Art Museum, and an Art Museum such as would appear a possibility in Toronto, are probably very different things; to accomplish the latter, as much as possible of the quality of the former should be aimed at.

The situation of such an institution should be carefully selected; it would be a blind policy to take a poor site because it was cheap or was available as a donation.

Perhaps the most difficult thing to guard against, when a great public institution is being founded by the generosity of citizens, is the gift bound by conditions which may rob it of its most valuable quality. That gifts should have conditions is reasonable, but it would be better to go at a slow pace in founding a home for the arts in Toronto, asking for donations with objects well defined and application of the funds guaranteed. Therefore, to found an Art Museum in Toronto the Society of Artists believes that an association should be formed at the outset which would have the power and responsibility to outline a plan and carry it out, to receive bequests and grants and apply them to the purpose for which they were intended.

This Art Museum should be undertaken on the principle of gradual growth; that is, development of the building and what it is to contain. The whole plan should be so prepared that a small portion could be built at first and added to from time to time; the buildings to be fireproof, affording security to valuable works of art received as loans or bequests.

Accommodation should be provided in the building for the School of Art and Design, as an integral part of the museum, and suitable galleries should be kept for current exhibitions.

A fund for maintenance could be provided by a citizen's honorary membership fee, carrying with it privileges of library, lectures and exhibitions, thus making a continual connection with those interested in art for the carrying on of the government of the institution. The Art Societies and School would be independent bodies, occupying a portion of the building as tenants.

The foregoing suggestions are offered in the hope of bringing together those who are interested in the founding of an Art Museum worthy of Toronto; on the formation of an association of citizens, the shape it should take can then be determined.

For the purpose of bringing forth additional suggestions and to show what has been and what is now being done, in cities of the same size as Toronto and also in some of the greater cities, a list is appended of art associations, museums, institutes, etc., their bequests and outlines of government. Full particulars of all these associations have been ascertained and are available for reference when needed.

TESTS OF FIREPROOFING MATERIALS.

The British Fire Prevention Committee have reported the results of recent tests of girder coverings by the "Gypsine" Brick Co., Limited, of London and Paris. The report states that "exact details as regards the composition of the girder-coverings used were not given, the materials of which these coverings might be composed alone being named by the maker. As we have here a case where the exact composition and proportions of the substances used in the composition of the coverings must affect their fire-resistance, it is to be regretted that the details were not given. It makes it so much more difficult for the architect to know whether the protective coverings put on the market are identical with those which have been under investigation."

The object of the test was to record the effect of a fire of one hour's duration, commencing at 500° Fahr., and increasing to 1,800° Fahr., followed by the application of water for two minutes.

NOTE.—Two types of protective compositions were to be tested around 7 in. steel joists, the one joist being covered by a composition applied as plaster about one inch thick, the other joist bedded in a composition about 3 in. thick.

NOTE.—The time allowed for the construction and drying of the covering was to be a fortnight.

The following observations were made after the test in respect to the beam of larger section:—

There was a longitudinal crack on the soffit of the protecting material for about half the length.

There were fine hair cracks on all surfaces of the protecting material.

The lower arrises of the protecting material were damaged.

The protecting material was very sodden from the applied water, and was very soft and easily impressed.

The composition remained attached all round, and the girder was not affected by the test.

The following observations were made after the test in respect to the beam of smaller section:—

A layer of the protecting material to the soffit of beam of about 5/8 in. thickness had become detached and had dropped off.

The sides of the protecting material showed vertical cracks, and the surface of the material showed fine hair cracks on all faces.

There was a longitudinal crack in the protecting material on the top surface.

The protecting material was sodden with the applied water, and was soft and easily impressed.

St. Davids, Ont.—Sketched by A. A. Martin.

ARCHITECTURE IN MANITOBA.

[By a Contributor.]

In reviewing the progress of the building art in Manitoba, the tender age of the province appeals to our consideration. It was only the other day, June 23rd, 1870, that the Dominion government bought these lands from the Hudson Bay Co. for 300,000 pounds sterling and entered the province into federation. The population then being 11,965, of which 5,694 were French half-breeds, 4,076 English half-breeds, 1,614 whites, and 581 Indians, it now is over 250,000.

Architecture being to some extent a sensual gratification, was not studied by the early settler, who was satisfied with the humblest kind and cheapest form of building, be it constructed of logs or lumber, as long as it served the purpose of habitation, though not calculated to withstand the severity of the long and trying winters. To this day some of these old buildings are still extant, but are being rapidly replaced by more modern structures, for, architecture, which may be said to be one of the first steps in the great march of civilization, appealing to the eye and affording the best scope for the parade of pomp and splendour, received more patronage and resulted in a better class of buildings, more noted, perhaps, for their simplicity, symmetry and solidity than their architectural beauty or purity of design, and in many instances, the incongruity of the composition suggested at least an imperfect acquaintance with the first principles of architectural design. This is not altogether the fault of the designer, but attributable to the economy, or rather, parsimony of his client, whose crude taste has not been properly trained to better judgment in the matters architectural. This prevalent desire to obtain cheap buildings has resulted in contractors entering into competition with the architects, and owners of property have given them considerable encouragement. This procedure saves the architect's fees, but it is open to question and future history whether such buildings are cheaper. This state of things is due to there being no western association of architects, which would have the tendency to make an organized association of architects more honored and their services more remunerative.

The province throughout is waking up to the fact that more attention must be paid to the art of building, and in the cities and towns the building by-laws are being revised, being brought up to date, and, more important, being enforced. Winnipeg has followed the safe example of older cities and has appointed a building inspector from whom permits must be obtained.

The severity of the winter demands greater attention paid to the warm construction of buildings than perhaps any other country, and has exercised the constructional ability of local architects to no small degree, but with very favorable results.

During the last year or two several fine buildings have been erected in Winnipeg, notably the Manitoba Trust Company, the Bank of Commerce, and the Dominion Bank, and though the credit of the designs falls to eastern architects, they are an acknowledged and gratifying addition to the architecture of the city.

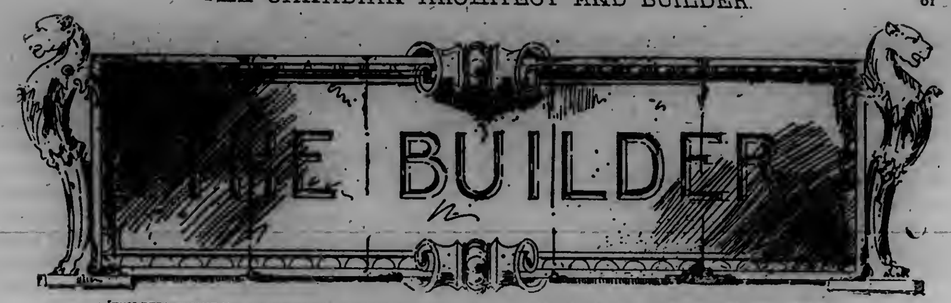
The present year indicates further progress, in such important buildings as the C. P. Ry. hotel, a new Y. M. C. A. building, Merchants Bank, and others in the city, while the whole province predicts an unusually active season in building operations.

NEEDED IMPROVEMENTS AT TORONTO INDUSTRIAL EXHIBITION.

At the annual meeting of the Industrial Exhibition Association of Toronto held recently, Mr. J. O. Thurn, manager of the Metallic Roofing Company of Canada, urged upon the board of directors the necessity of erecting new buildings which would afford proper accommodation to manufacturers and exhibitors in other departments. Mr. Thorn stated that, owing to imperfect accommodation and unsatisfactory treatment, 90 per cent. of the implement manufacturers had decided not to exhibit, and for the same reason the manufacturers of stoves and heating apparatus had also unanimously decided to refrain from exhibiting until a suitable building is provided. The fact that the Ontario Society of Artists have, for years past, endeavored to have proper provision made for art exhibits, was also mentioned.

Architects and others interested in architecture will coincide with the following expression of opinion regarding the necessity for a more artistic treatment of buildings which may be erected in the future on the exhibition grounds: "There is certainly a strong feeling that in the erection of any further buildings a little more regard for the architectural effect would benefit both the exhibition and the exhibitors. In the various continental exhibitions of late years, the attention given to the designing of the buildings, no matter how inexpensive, has been very great; the results, temporary and permanent alike, have been very marked. A number of the present buildings to my mind resemble packing cases more than anything else."

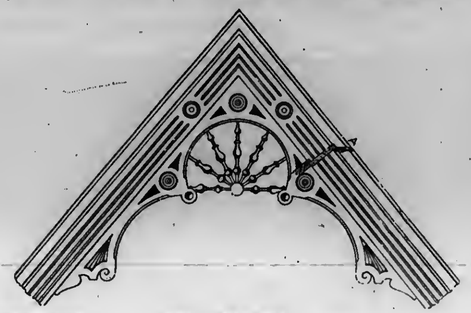
Mr. Geo. Polly, who goes to Vancouver as the representative of the James Robertson Co., Limited, of Toronto, was handsomely entertained by the firm and presented with a well filled purse on the eve of his departure for the west.



[This department is designed to furnish information suited to the requirements of the building trades. Readers are invited to assist in making it as helpful as possible by contributing of their experience, and by asking for particular information which they may at any time require.]

Gable Ornaments.

There are many very beautiful patterns of barge-boards and gable ornaments on old buildings both in England and Germany, many of which are elaborately carved and cut into fantistic yet appropriate forms and fill their purpose to perfection. In this country we rather follow the Swiss and French methods of finishing our gables than the more solid and durable English and German, "more's the pity." The illustration shown herewith gives an open gable with a built-up barge-board. It is neat, quite effective, and not costly to make. The turned spindles add materially to the design and are neither difficult to make nor costly. The rosettes are also turned and are planted on. The method of construction, with the crown moulding, is shown at A. Gables of this kind are well adapted for frame buildings



Gable Ornament.

where paint and color are important factors, but, for brick or stone buildings heavier and more substantial ones should be employed.

Estimating Sheet Metal Work.

In making estimates for sheet metal work, it is necessary that persons estimating should have a proper knowledge of the method of reading and measuring plans, and this can only be acquired by cornice men after long, careful and close study and observation. The following hints will, in some measure, supply what some may lack in these important qualifications: When the amount of sheet metal is determined that will be required to do a certain job of cornice work, the next question that presents itself is, how much time and labor will it take to do the work? There are almost as many ways employed to arrive at the result sought for as there are ways of doing the work itself. Some guess at the time, comparing the work under consideration to that of a similar character and design done before. Knowing, of course, the amount of time that it has taken to do the preceding work, a nearly correct estimate can be made as to the time it may be required to do the work now in hand. The method as described is used in a good many shops with sometimes widely differing results as to the actual time required, sometimes being too low an estimate and quite often too high to be in any way near correct. The way that is most prevalent for sheet metal workers to bid on work is by lump figures, that is, the plans and specifications of certain works are submitted by the architect to the metal worker, and he gives a figure for whatever amount he is willing to do the job complete for, in a lump sum. It also sometimes occurs that a bid is asked for a cornice or other work by the running foot, or by the square foot for the work complete on the building. If the result has been obtained in a manner as shown by the "snap" rule, it is only necessary to divide the work on which the price is based into feet, and discover the price of this per foot, then multiply the number of feet of work to be done by the amount per foot cost of the work finished, which will give some idea of a correct estimate. This method, though well enough in the absence of a better one, is not to be commended, as it is a sort of hap-hazard way of arriving at a result which ought to be correct, but rarely is, as many a sheet metal worker has found to his cost.

Correct Way of Estimating.

A reliable way to estimate is to figure up on the entire items of a cornice or other work separately, such as, 1st, work in the shop on the cornice; 2nd, transportation from shop to building when the work is to be put up; 3rd, cost of scaffolding; 4th, the cost of putting the work on the building; 5th, cost of materials, including tinned nails, solder and sheet metal. In some large establishments the following plan is used to determine the cost of almost any member of a complete cornice: We will take say a bracket, or any member of a cornice for that matter. The first step is to make a drawing of the desired shape full size, and cut out a pattern; note the time very carefully, also note the general character of the design, size and shape, next the work done on the forming, bending, joining and soldering together of the various parts of the work. When the member is completed, the weight, including cuttings and waste, size, general description of the work, and the precise time it has taken to complete the work, future calculations for all similar work can safely be based on the results obtained. The same method is used to obtain the price of all the different parts of cornices or other works coming under the sheet metal workers' department, thus securing for all time a safe and reliable guide for future estimates and calculations. While the foregoing would hardly be applicable to small shops in

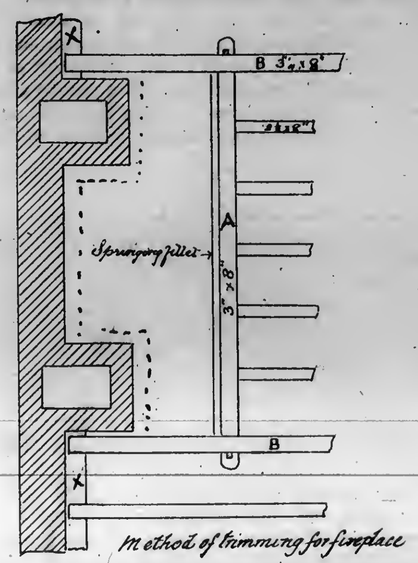
our country towns, still it is to be recommended to the careful and prudent working man to keep a close record of all the work he does for future reference. For those who have not had a great deal of experience in this most important branch of the cornice business, the great number of catalogues sent out by wholesale houses who sell to the trade, the illustrated price lists, etc., will prove of great value to the beginner, insomuch as he will find therein the prices charged to the trade for almost every conceivable shape or pattern of cornice or other work he may require, and as these lists are subject to a trade discount, the country metal worker will generally find it to his interest to purchase the work ready to put up from the wholesale dealer.

Notes on Foundations.

A few accepted conditions required for good foundations are herewith presented: If for a frame building, footings two feet wide will answer in almost any solid ground. If, however, the ground be soft or boggy and wet, a good plank bottom four or five feet wide may be necessary. The planks should be in several layers and crossed. Good stone footings may be placed on the top tier of planks; much will depend upon local conditions of the soil. For a brick or stone building, wide footings must be employed, and these should always be below the frost line. A cellar floor should never be below the top surface of the footing stones, and, if the foundation is built on sand, the cellar, or other excavations, must not be carried below the footings or serious results may follow. The depth of a foundation will depend on several conditions: the nature of the soil, the purposes for which the building is intended, the weight of the walls, etc., etc., and can only be properly determined by local knowledge. Rock, if not seamy, generally provides a good foundation. The surface should be levelled off, and all loose and decomposed stones removed, when all hollows and cracks should be filled up solid with a fine grained concrete. Sand or gravel, when not water-soaked, make good foundations, and are quite healthy to live over, but clays, loams, marl, and alluvial soils are naturally damp and unwholesome. Gravel makes a good solid foundation; it may be levelled easily and will stand any amount of pressure. Sand forms a good bed for footings if dry, and if not allowed to escape laterally will bear great weight. Made ground of any kind is not to be trusted. When this occurs, the trenches should be dug down to the original ground, or else piles driven through the made ground until they reach the original bed. If there are layers of hard and soft ground, the foundation should be laid on the hard layer, and the footings should be wider than usual in order to get a greater bearing area. Soft places or pockets in the trenches should be tramped down, or piles should be driven in them, or they should be filled with concrete and relieving arches thrown over them to prevent uneven settlement of the walls. If the ground under a building be of a soft nature, it will of necessity yield or compress beneath the weight placed upon it. If any part of a building be loftier and more weighty than the other portions of it, as in the case of a tower or steeple, the soil beneath the extra weight will be more compressed than the other parts of the site, and will, therefore, require a broader foundation than the other walls, or that portion of the building will settle lower, and thus tear away from the lighter wall, leaving ugly cracks and breaks in the brick or stone work, which may prove a very serious matter. Uniformity of foundation and resistance to compression is of the utmost importance for the purpose of securing the requisite stability, and great care should, therefore, be bestowed upon the examination of the trenches so as to see that a uniform hardness be obtained. There should, in all cases where possible, be a good system of drainage around the bottom of the foundation, in order to keep the whole of the walls perfectly dry. Weeping tiles should also be laid in the cellar and connected with the drains outside of walls. These will tend to keep the walls dry on both sides and make the cellar more healthy. Ordinary field tiles make very good weeping tiles.

Trimming for a Fire-Place and Hearth.

The ordinary method of putting in trimmers around a stair, well-holes and around fire-places by cutting in pieces of joists and spiking them to the bearing joists is all wrong. The bearing joists should always be an inch or so thicker than the common joists and should be morticed to receive a tenon or tenons on the ends of the trimmer, as shown in the diagram. In this case,



Method of trimming for fireplace

the bearers B B run across the building, having their ends resting on the projecting stone foundation wall, and the trimmer A is tenoned through them, and keyed snug to the bearers as shown. The common joists may either butt against the trimmer and be spiked, or, better still, tenoned into the trimmer. The springing fillet is intended to carry one side of a flat arch, which should be carried over to the protecrion on the stone wall. This arch is intended to carry the hearth, which is to be either finished in cement, or laid with tiles, ornamental or otherwise as may be decided on.

The works of the Georgian Bay Portland Cemedt Company at Owen Sound, Ont., are being extended by the erection of a storehouse 260 x 40 feet in size.

"I heard ye were on 'shtrike,'" said Mike to his friend Pat. "I was that," answered Pat. "A strike for what, Pat?" "For shorter hours, Mike!" "An' did you get them?" "Sure we did, Mike. It's not working at all I am now!"

CONCERNING BRICKS AND BRICKWORK.

By Fred T. Hodgson.

In view of the fact that wood for building purposes has advanced in price to such a point that it is becoming a luxury, its uses in domestic architecture is certain to become less prevalent than formerly, when it was almost the only building material available in our more remote districts. Nowadays, however, the farmer or villager who intends building, thinks twice before he determines the material of which his house is to be constructed. At this writing, the difference in cost between a solid brick house and a good frame house, is so little, that all thoughtful men decide on the former, all things being equal, and are in the end better satisfied.

Bricks, both machine and hand made can be obtained in almost every settled portion of the Dominion, equal in quality to any bricks made, though first-class productions are more expensive than they ought to be, and even the inferior grades are priced too high. This, however, may be owing to two causes, first, the lack of the most improved methods and machines in manufacturing, and second, because of the limited demand for bricks. At Haverstram on the Hudson, and at other places where extensive brickmaking is pursued, the finished product can be bought some 20 to 40 per cent. less than in many places in Canada. I have seen hundreds of thousands sold for $4 per M. f.o.b., and in some cases, in large deals, for something less than that. Another thing that militates against a freer use of bricks, is the exorbitant railway and boat charges. If the rates could be cut down some 25 or 30 per cent.,

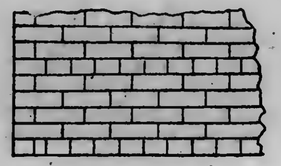


Fig. 1.—American Bond.

and the price of the bricks lowered a trifle, the narrow gap between the price of a frame building and the price of a brick building would almost disappear, and the demand for burned clay would likely be doubled in a year or two.

Bricklayers themselves could help very much to increase the use of bricks if they would but make good careful work of what they do execute, and avoid the practice of making their walls a sort of tartan exhibit, or a representation of a huge checker board stood up on edge, by introducing cream, grey, buff, and red bricks, regardless of method or good taste. No bricklayer, unless he is a man of much experience and good taste, should attempt on his own responsibility, to decorate his building with various colored bricks. Only a master can do that well, and he uses strong contrasts sparingly.

Various shades of the same color when properly disposed, may be made to add to the appearance of a brick wall if the fenestration is skilfully devised; but good workmanship, with even mortar joints, and a judicious selection of face bricks and proper attention to the bonding, go farther to give a building a solid and cosey appearance, than any combination of ordinary colored bricks possibly can.

Bond, in brickwork, is a very important matter in several directions, though in this country, there is usually but one kind of bond in vogue, namely, that called "American Bond," which simply consists in showing four or more corners of stretchers and one of headers on the face as shown in Fig. 1. This makes a fairly strong wall but does not look nearly as well as English bond, an elevation of which is shown at Fig. 2,

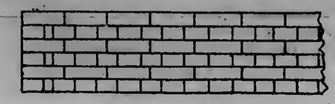


Fig. 2.—English Bond.

or as well as Flemish bond exhibited at Fig. 3. The English bond is the strongest of bonds, being alternate courses of headers and stretchers, while Flemish bond consists of headers and stretchers in the same course. This makes a very handsome bond, particularly if the bricks are of a fine deep red color and the joints are

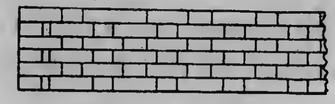


Fig. 3.—Flemish Bond.

laid up with fine gray mortar with cut joints. There are several other kinds of bond, such as garden wall bond, face bond, etc., etc. Sometimes, if the walls are three or more bricks thick, a sort of diagonal bond is employed in order to tie the wall together. I show a couple of examples at Fig. 4. In these cases, the face

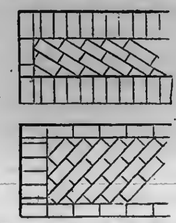


Fig. 4.—Diagonal Bond.

of the wall on both sides, may be laid in any of the bonds shown, and the core of the wall laid diagonally, reversed in alternate courses. Walls of this kind, when intended to do much work, should be well put together with good mortar filled in between every joint.

There is another bond sometimes made use of by bricklayers and which is very useful in some cases; this is called "blind bond," and is generally used in tieing the front course in pressed brick work, where it is not desirable that any headers should be seen in the face work; and when the binders are good hard-burned brick, and the backing up is properly executed, it appears to answer well enough for ornamental brickwork and fronts of structures; but to construct the exterior face of a wall with costly hard-pressed front bricks, laid in close putty joints, and then to back it up with soft bricks and the joints sometimes one-half inch thick or more, and a binder not in for a dozen courses, is the worst sort of workmanship, and should not be tolerated.

To form this bond, the face brick is trimmed off at both ends as shown at Fig. 5, so that it will admit a

binder to set in diagonally from the face of the wall, and every layer of these binders should be tied with a header course the whole length of the wall. The binders should be put in every fifth course in order to get the best results, and it is evident that the backing up of this work should be done in the most substantial manner with hard bricks laid in a close joint, for the reason that the face work is laid in a fine putty mortar, and the joints consequently close and tight, and if the backing is not the same, the pressure upon the wall will make it settle and draw the wall inward.

The bricklayer, in starting this kind of facework, should take care and have the work so laid out on his wall that no bats or closers will appear in any part of it; and in a first class job, the doors and windows will be so arranged that such will be the case. Little matters of this kind, while they do not take up much of our time, add much to the building, both in appearance and in quality.

For domestic buildings, brick seems to be the most appropriate of all materials, cool in summer without being damp, warm in winter without many of the disadvantages that accompany stone or wood. The color

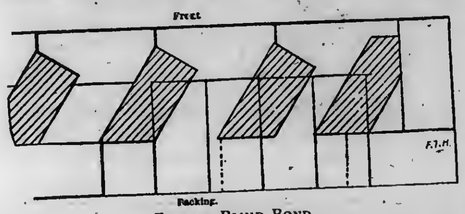


FIG. 5.—BLIND BOND.

and texture of brick harmonizes with any surroundings, and there is a cosiness about it that imparts a feeling of comfort and content that no other building material can convey. Of course, there are degrees of these qualities, dependent somewhat on the color of bricks employed and the pretentions of the structure, together with the surroundings, but in the main the homelike qualities are always present in a brick building, no matter for what the building is intended.

The necessary requirements for a good, substantial brick house are: First, a solid and ample foundation of stone or other suitable material; second, good hard-burned bricks of some regular color; third, properly proportioned and made mortar; fourth, good and careful workmanship on the part of the bricklayer. If these requirements are honestly complied with, the most satisfactory results will ensue, and the building will be a "joy for ever." Cottages, one storey or one and a half storey, may have walls one brick in thickness (nine inches); and as this is a light wall, a foundation, on most soils, sixteen inches thick, with footing twenty inches wide, will be ample to sustain it. The wall should be rendered inside—that is, given one coat of good plastering, and over this a series of strapping should be nailed with centres sixteen inches apart. The strapping should be plumb and fair on the face. Over the strapping is a coat of lath and plaster done in the usual manner, care being taken that the plaster is well worked in about the windows and doors in order to shut out the cold. In a wall of this sort we get, first, a solid brick wall nine inches thick, next a coat of plaster, then an air space of one inch, produced by the strapping, then we have the inside lathing and plaster; all of which, when well executed, should make a comfortable house. To make the house still warmer, I have seen the walls, after being rendered and permitted to dry out, lined with heavy building paper before the strapping was nailed in place, a method which insures warmth in winter and preserves a cool temperature in summer.

Sometimes two-storey buildings of brick are put up with nine inch walls. This system is not to be commended, as a nine inch wall twenty or twenty-two feet high, as the case may be, is not a very strong one, and must be well supported from the inside to give it stability enough to resist a wind pressure of 30 or 40 pounds to the square foot, or support a roof having a large area. It is always better to make the walls in the lower storey of a two-storey house thirteen inches, or one and a half brick, thick. The second floor joists can then rest on the offset formed by the upper storey wall falling back four inches, the top wall, of course, being only nine inches thick. In the case of a three-storey building, the lower storey should be two bricks in thickness, the second storey one and a half, and the top storey one brick thick. In fact, it is a good rule to follow, to add a half a brick in thickness to the lower storey for every extra storey in height. An increase in the height of wall, with the necessary increase of thickness, requires a corresponding increase of resisting power in the foundation, and an extension of the area of the footings. No brick building, two storeys or more in height, should have foundation walls less than eighteen inches in thickness, with footings two feet wide. Buildings three storeys high should have foundation walls two feet thick, with footings at least three feet broad.

As dwellings are seldom more than three storeys high—and it is to this class of buildings this paper more particularly refers—a further discussion of footings, foundations and thickness of walls is not necessary here, but, before leaving the subject, I might say there is no reason why good bricks—hard burned—might not enter largely into the construction of foundations. They will resist all the pressure necessary, look well, will not absorb more moisture than many kinds of stone do, and are always available. Bricks, also, might be used more freely in the construction of fences, posts for entrance gates, paving cellars, and a hundred other purposes. A greater demand for bricks would give us a better article at a reduced price, conditions worth striving for.

The chief of the Winnipeg fire department in his annual report to the council, adverts to the careless and dangerous construction and arrangement of buildings, which he insists has much to do with large conflagrations. He suggests that a provision be made in the building by-laws regarding elevators, staircases, etc. He thinks these dangers could be guarded against, and that too much dependence is placed on the fire department for protection. The smallest water mains, he claims, should not be less than six inches, and hydrants should be properly drained to prevent freezing.

In the new extension to the Boston State House, the rear staircase, which is an elaborate piece of wrought ironwork, has been coated with aluminum leaf, with the ornamental portions touched with umber, and in some cases the sunk panels on the square newels and the panels of the open soffit of the stairs have been shaded in umber, the whole thing being then varnished, giving a soft effect. Similar results, though not quite so durable, can be obtained by using aluminum bronze instead of the aluminum leaf. If gamboge is used for glazing instead of umber, a golden tone is given, somewhat approximating in effect to that obtained by using gold leaf. Dull tones, resembling the appearance of oxidized silver, are got by skillfully glazing with asphaltum over aluminum leaf.

SIZES OF PIPES FOR HEATING HOUSES WITH HOT AIR.

WE present herewith an extract from an interesting article contributed to a recent issue of The Metal Worker by William G. Snow, who has had a long experience in hot air furnace work:

Much larger furnace pipes are now used than formerly. This involves a greater original outlay and an increased running expense for fuel, but the householder is repaid by the more healthful conditions secured through the supply of an ample volume of warm air in place of a small volume of intensely heated air. The pipes should be so proportioned that the several floors will be heated equally.

Table IV, calculated as explained below, will be found useful in determining their size. It must be borne in mind, however, that in heating and ventilating work no rule or table can be successfully used without a certain co-efficient of common sense to allow for varying conditions.

Having obtained the equivalent of glass surface (E. G. S.) multiply by 85 (the loss of heat per square foot of glass per hour with 70 degrees difference in temperature). The product will be the total loss of heat by transmission per hour.

The volume of warm air required to offset this loss depends on its temperature, which generally ranges from 120 to 140 degrees in zero weather. Assuming the temperature of the entering air to be 140 degrees and that of the room to be 70 degrees, the air escaping at approximately the latter temperature will carry away one-half the heat brought in. The other half, corresponding to the drop in temperature from 140 to 70 degrees is lost by transmission. With outside temperature zero each cubic foot of air at 140 degrees brings into the room 2.2 heat units. Since only one-half of this, or 1.1 heat units, can be utilized to offset the loss by transmission, to ascertain the volume of air per hour at 140 degrees required to heat a given room, divide the loss of heat by transmission by 1.1; the quotient is

TABLE IV.—SHOWING THE PROPER SIZE OF FURNACE PIPES TO HEAT ROOMS OF VARIOUS DIMENSIONS WHEN TWO SIDES ARE EXPOSED. TEMPERATURE AT REGISTER 140°, ROOM 70°, OUTSIDE 0°. ROOMS 8 TO 17 FEET IN WIDTH ASSUMED TO BE 9 FEET HIGH. ROOMS 18 TO 20 FEET IN WIDTH ASSUMED TO BE 10 FEET HIGH. FOR OTHER HEIGHTS, TEMPERATURES OR EXPOSURES MAKE A SUITABLE ALLOWANCE. WHEN FIRST FLOOR PIPES ARE LONGER THAN 15 FEET USE ONE SIZE LARGER THAN THAT STATED.

Width of room.	Length of room. 8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
8	7	7	7	7	7	7	8	8	8	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	8	8	8	8	8	9	9	9	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
9	..	7	7	7	8	8	8	8	8	8	8	..	..	..	..	..	..	..	..	..	..	..	..
	..	8	8	8	9	9	9	9	10	10	10	..	..	..	..	..	..	..	..	..	..	..	..
10	..	..	7	7	8	8	8	8	8	8	8	9	9	..	..	..	..	..	..	..	..	..	..
	..	..	8	8	9	9	9	10	10	10	10	10	10	..	..	..	..	..	..	..	..	..	..
11	..	..	..	8	8	8	8	8	8	8	9	9	9	9	..	..	..	..	..	..	..	..	..
	..	..	..	9	9	9	9	10	10	10	10	10	11	11	..	..	..	..	..	..	..	..	..
12	..	..	..	..	8	8	8	8	8	9	9	9	9	9	9	10	10	..	..	..	..	..	..
	..	..	..	..	9	9	10	10	10	10	10	11	11	11	11	12	12	..	..	..	..	..	..
13	..	..	..	..	..	8	8	8	8	9	9	9	9	9	9	10	10	10	10	10	..	..	..
	..	..	..	..	..	10	10	10	10	10	11	11	11	11	12	12	12	12	13	13	..	..	..
14	..	..	..	..	..	..	8	9	9	9	9	9	9	9	10	10	10	10	10	10	10	10	..
	..	..	..	..	..	..	10	10	10	11	11	11	11	12	12	12	12	13	13	13	13	..	..
15	..	..	..	..	..	..	..	9	9	9	9	9	9	10	10	10	10	10	10	10	11	11	11
	..	..	..	..	..	..	..	10	11	11	11	11	12	12	12	12	13	13	13	13	13	13	13
16	..	..	..	..	..	..	..	..	9	9	9	9	10	10	10	10	10	10	10	11	11	11	11
	..	..	..	..	..	..	..	..	11	11	11	12	12	12	12	13	13	13	13	13	13	13	13
17	..	..	..	..	..	..	..	..	..	9	10	10	10	10	10	10	10	10	11	11	11	11	12
	..	..	..	..	..	..	..	..	..	11	12	12	12	12	13	13	13	13	13	13	13	13	14
18	..	..	..	..	..	..	..	..	..	..	10	10	10	11	11	11	11	11	11	12	12	12	12
	..	..	..	..	..	..	..	..	..	..	12	12	12	13	13	13	13	13	13	14	14	14	14
19	..	..	..	..	..	..	..	..	..	..	..	10	11	11	11	11	11	11	12	12	12	12	12
	..	..	..	..	..	..	..	..	..	..	..	12	13	13	13	13	13	13	14	14	14	14	14
20	..	..	..	..	..	..	..	..	..	..	..	..	11	11	11	11	11	12	12	12	12	12	12
	..	..	..	..	..	..	..	..	..	..	..	..	13	13	13	13	13	14	14	14	14	14	14

One 12-inch pipe ..... = two 9-inch pipes. One 15-inch pipe ..... = two 12-inch pipes.
One 13-inch pipe ..... = two 10 inch pipes. One 16-inch pipe ..... = two 12-inch pipes.
One 14-inch pipe ..... = two 11 inch pipes. One 17-inch pipe ..... = two 13-inch pipes.

In the space opposite the numbers indicating the length and width of room, the lower number shows the size pipe for first floor, the upper number the size pipe for second floor.
For third floor use one size smaller than for second floor.
For rooms with three exposures increase pipe given in table in proportion to the exposure.
For halls use pipe of ample size to allow for loss of heat to second floor.

The main steps involved in the calculation of the above table are:

1. The determination of the loss of heat through the walls, windows and floor or ceiling of the room.
2. The volume of warm air required to offset this loss.
3. The velocity of air in the pipes.

The loss of heat is calculated by first reducing the total exposure to equivalent glass surface. This is done by adding to the actual glass surface one-quarter the area of exposed wood and plaster or brick walls and one-twentieth the area of floor or ceiling to cover the loss of heat to non-heated basement or attic. Ten per cent. is added where the exposure is severe to cover the increased loss of heat by transmission and by the leakage of air. The window* area assumed in calculating the table is one-fifth, or 20 per cent. of the entire exposure of the room. From the inspection of a number of plans this ratio was found to represent a liberal allowance for glass surface.

* Double windows, when tightly put in, transmit about three-fifths as much heat as a single window

the volume sought. This result divided by 60 gives the number of cubic feet per minute. Having determined the volume of air required per minute, if we know the velocity with which it will travel through the pipes, their area in square feet is readily determined by dividing the volume by the velocity in feet per minute. This area is easily reduced to square inches, from which the diameter of the pipe may be obtained.

In calculating the table maximum velocities of 280 and 400 feet were used for pipes leading to the first and second floors respectively, These velocities are readily attainable in practice. They are lower than those commonly assumed for straight vertical flues, but this is accounted for by the greater resistance to the passage of air through the nearly horizontal basement pipes, and through elbows, nettings and registers. The size of the smaller pipes was based on lower velocities, according to their size, to allow for their greater resistance and loss of temperature.

ESTIMATING FOR STONE WORK.

Estimating, as known by those who are conversant with the subject, is not a matter in which the haphazard or rule-of-thumb methods should be tolerated by contractors ; and yet, it can be safely stated that fully one-half of all the estimates made for stone are based on guesswork. In the absence of a correct system of collecting values, many contractors bid on work when the amount of their bid is excessively high or ridiculously low ; or if the bid should be near what it ought to be, it is more through accident than the result of a nicely wrought system which should enable them safely to determine the cost of production, if not exactly, so near to it that at all times, so far as their listed values are concerned, they can be as certain of their "net cost" being as nearly correct as under existing conditions it is possible to make it. And until a contractor is certain of this, he cannot, in these days of close competition, be sure of how he stands with regard to a contract until all of the work is completed, all of the outstanding bills paid, and all moneys paid in connection with the work, which may be due him, collected ; and then he is apt to find that he has lost money on his contract, which is a fact that has been demonstrated only to often.

The writer has in mind the methods of some contractors that are not governed by the rules deduced from the science of bookkeeping ; but, rather, is the ever-ready system which they carry under their hats ! They require no system which entails the use of averages to enable them to figure closely on any work that may come before them, the result being that no man, however competent to do the work of estimating under the proper conditions, can ever hope to be able to fix the value of work during the absence of the contractor himself, whereas, under a proper system one qualified in every other respect to do the work as it should be done, would have no difficulty in estimating to the satisfaction of all concerned. In other words, the business would run itself, so far as relates to estimating, responsibility could be fixed to an absolute certainty, and the mental comfort resulting from a well organized system such as herein indicated, would more than repay the small amount of labor required to institute it. It is this class of contractors to whom this paper is addressed.

Following the completion of a contract in which a loss has been sustained, it is but natural that a contractor should ask himself : Who is to blame for this state of affairs, and how can it be avoided ?

It is evident that a proper presentation of the subject demands that this question should be answered in its relation to the one who superintends the work, the one who figures the work and the contractor for whom the work is figured, inasmuch as all three either directly, or indirectly, affect the estimate ; and it is also evident to those who have given the matter serious thought, that the contractor himself is often to blame for poor work that is done in his office.

In order that a contractor may justly exact a prime quality of work from the one who he employes to do his estimating, he should endeavor to place at the command of the estimator every facility necessary to insure full and correct data, as well as to give him ample opportunity to study work in all stages of its production, and to keep thoroughly in touch with those whose duty it is to see that the work comes out to the best advantage, unless, perchance, the man who does the estimating should be the man that gets the work out, in which case he would be in a position to watch the cost of production to a nicety. It is not possible for the contractor to secure the best service from the man in charge of the estimating in any other manner ; and he would do well to bear in mind that, with a man who is honest, and capable in other directions for assuming the responsibility of fixing the figure at which a contract shall be taken, he will best subserve his own interest by reposing full confidence in him as to all that relates to his work ; affording him full opportunity to post himself as necessity may require ; consulting with him fully at all stages in the preparation of an estimate ; and, in a sense, making him, for the time being one of the firm, in which the interest is mutual. In this way the estimator is encouraged to take the fullest interest in his work ; will feel that his best efforts are thoroughly appreciated ; and, if there is no manhood lacking in his composition, can be relied upon by his employer to exert himself for the best interests of the firm. Failure to observe the principle involved in this statement has often resulted in heavy pecuniary losses to the contractor, in lost reputation to the estimator, who, perhaps, was thoroughly qualified to do his work safely had he not been compelled to work under adverse conditions.

Given the opportunity as outlined above, the contractor may reasonably expect that the estimator may be able to produce an estimate which shall represent the net cost of production and should understand that this estimate is governed solely by the cost of getting the work out in his own shop, whether it be higher or lower than that which may be expected from the shops of his competitors, as it is obvious that any difference in the cost of production in his shop, as compared with that of his competitors, is chargeable to the methods of operation in vogue in the shop, the degree of difficulty in working the material, as well as to the means of handling work which may be at the disposal of those charged with the conduct of operations—this under the assumption that his competitors, as well as himself, work along the lines indicated herein, according to a correct system. Insomuch as the contractor fails to observe these principles, he is justly blameable for losses which may accrue from a failure to do so, always implying that all other requirements for the production of a correct estimate are not wanting in his shop.

An estimator who is thoroughly qualified to under take the task of fixing the value, or net cost, of the stonework for a building, for instance, should, first of all, be a practical man ; and the more practical he is as a stonecutter the more extensive his knowledge of the stone to be figured, and the working of it, the more valuable he is as an estimator. Indeed, without this experience and knowledge, all other qualifications necessary, too, in the estimator, become practically inoperative. In fact, outside of the simple, plain figuring, without practical knowledge which comes from the use of the tools and observation in the shop, and at the building, no person can honestly lay claims to being capable of producing an estimate which can be considered safe in any particular. Then the estimator must, as a prime requisite, be prepared to figure correctly from such units of value as may be gathered from the shop records, but he must also be ready and able, by reason of previous experience in a practical sense, to determine the values of such intricate or new work to which the shop records have no reference ; for, it is evident that only a man who is qualified through practical experience and trained observation is able to ascertain the value of such work safely. The contractor cannot reasonably look for close and safe estimates from an estimator who is not qualified as stated, even though his ability to read or make drawings remains unquestioned. Even then, as noted before, the estimator must be in touch with the shop and the ever-changing records to be capable of producing the best results.

Another qualification of the estimator is his ability to read drawings. And he is still better qualified if he is skilled in making of all kinds of drawings which are to be found within his sphere of duty ; because he is thus able to see with the draughtsman's eye and discover, accordingly, much that is necessary to the proper discharge of his duties, and which, otherwise, would escape his notice. Of course, it must be admitted that there are estimators who are not draughtsmen by profession, and who are thoroughly reliable as to estimating, but long practice or exceptional opportunity has developed in them the draughtsman's eye—the ability to see as the draughtsman does ; and consequently, that being the reason for the estimator's possession of this qualification, it cannot argue against the necessity for it. Then, too, the more thorough the estimator is as a draughtsman, the more thorough he is as an estimator. His ability in this direction is only secondary to the necessity for being practical as hereinbefore shown, both being necessary, his ability is proportionate to his strength of knowledge of each—draughtsmanship and practical stonecutting, which includes, of course, all that relates to the practical working of the stone, from quarry to building, if we would aim at perfection in this matter.

Next to the estimator's ability as draughtsman comes the mathematical qualification, which, in general, is simply arithmetical, although there are moments when he can advantageously use his knowledge of practical, descriptive and rational geometry, as well as plane trigonometry. This is so obvious a necessity that it is simply mentioned here as a qualification, and dismissed from further consideration ; but the last and very important requirement of the estimator, outside of "taking off quantity," which is understood to come within the bounds of draughtsmanship, is the preparation of the "quantities" for estimate. This presupposes that the estimator is well versed in the science of construction as applied to buildings, etc. ; that he understands from the drawings and specifications where to expect, and look for, all stone work in connection with the contract, whether it is a "girder block" hidden away in the brick backing, or stone work plainly shown on the elevations, plans, etc. ; that he understands how the stone work butts against the different materials, whether they be iron, brick, wood, etc. ; and in general, that he understands from the requirements of the drawings and specifications exactly how the stone work should be cut and set in the wall ; for then, and then only, will he be prepared to say fully how much stock shall be used in the execution of the contract, and how much labor must be involved. This being settled, we will consider the preparation of the quantities for estimating purposes. It is not intended here to elaborate a system, but simply to point out a few facts which are essential to good estimating, and which, taken in conjunction with what have been stated before, serve to show the duties of the estimator, and what should be required of him if he is not to be chargeable with inefficient service.

In arranging the quantities for estimating, it should be determined upon, at the outset, that all similar stones shall be grouped ; that is, all of the same size, profile and finish should be written in a column together, with the three dimensions and cubes, so that the calculations may be simplified as much as possible, on the principle that simplicity in this respect means speed and safety. Next in the order is the arrangement of those pieces which cannot be classified as similar. Having listed in this way all the stone in the building, the cubes should be brought out, aud added, in order to determine the amount of stock, and the cost of freight and handling. Before doing so, however, the estimator would do well to scan closely the specifications, and read them all through carefully, and ascertain whether some particular stones are hidden away, which are not shown on the drawings, as contractors often find to their chagrin, when shipments of stock take place, that there is some more work that they never figured on. The next step for the estimator is to determine the labor, and to find the net cost, all as has been indicated herein. These are his plain duties, and it is manifest that if he should be found wanting, as herein shown, the contractor has just cause for charging him with incompetency, and he is one cause of failure as pointed out before.

The next to be considered is the superintendent of the shop, and, perhaps, the quarries. It can be truthfully said that in him should be found all the qualifications of the estimator. His duties as superintendent require of him, if not at one time, at another, all the qualifications already described, and he should, in a well regulated establishment, be charged with the preparation of the estimates ; as it is obvious, unless a check be contemplated on the figuring, that he is in a position, with reference to all that which enters into the cost, to render the best service available.

After a careful consideration of what has been said here, it will become apparent to the contractors for whom this paper is intended that it is of paramount necessity for the success of their business that they should, first, systematize it so far as it relates to the work ; and, secondly, having secured the services of those well qualified to direct the work, and pass upon the value of it, there should be no difficulty in avoiding the financial pitfalls into which so many contractors have plunged unwittingly, and which can be easily guarded against, when seen. Then the contractor will know that when he fails to get a job that his figure was safely high, and that, if his figure is much lower than his competitor's, that he is safely low—in all cases he will know exactly how he stands with regard to a bid before he signs a contract.—F. T. Mallon, in Stone.

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LEGAL.

A case of a rather novel kind was recently tried before Mr. Justice Kenny in Dublin, particulars of which are given in the Builders' Reporter. The plaintiffs, Messrs. Byrne & Warman, were sub-contractors on tramway works, and they sought to recover £412 11s 4d from Mr. Ward, the contractor, for work done, materials provided, etc. The case in raality turned on the interpretation to be given to the words "per square yard" of excavations. The plaintiffs maintained that the words "square yard" meant a superficial square yard, the excavation being 1 foot deep, so that if the excavation were 3 feet deep, 1 square yard would count as 3 instead of 1, as contended by the defendant. On behalf of the defendant it was argued that the plaintiffs had received £410 on account, which was £63 11s 5d in excess of the amount due to them. It was also stated that "square yard," when applied to excavators' work, signified "cubic yard." The judge said there was no evidence to show that it was customary to consider a "square yard" of excavation as a superficial square yard, with a depth of one foot. If the plaintiffs' hypothesis were accepted, the defendant would have to pay them nearly three times as much as he was receiving himself. His lordship therefore decided the main point in favour of the defendant.

JAMES MORRISON, CONTRACTOR, VS. THE BELL TELEPHONE CO. —Judgment by Mr. Justice Curran of Montreal in an action by plaintiff for $2,969.93, balance due under a contract for lathing and plastering a building belonging to the defendants, situate on Notre Dame street in the city of Montreal. Plaintiff also claimed damages for having been retarded in his work through the fault of defendants. He further claimed for extras done in connection with the building, which he alleges were totally independent of his contract work. The defendants pleaded that the work of plaintiff was done under contract; that if any extras were performed, to entitle the plainiiff to payment, he should have obtained written orders, in accordance with the article of the Civil Code, and the terms of his agreement. Defendants further claimed that the delays, apart from that in starting work, which was due to vis major, were entirely owing to plaintiff's negligence and fault, and that such a delay caused great loss to defendant. Plaintiff never was authorized to do any extra work but for two items, one of $10 and the other $60. The work, which was an extra, was not done for defendants, but for the Hamilton Bridge Company, and plaintiff should look to them. The company asked $8,372 for insurance, for heating, and under the penalty clause of $30 per day for every day that the work was not completed after six weeks, the term agreed upon. The case was referred to Messrs. Hutchison, Wright and Doran, as experts, notwithstanding the company's opposition. The experts made a voluminous report. They came to the conclusion that the delays were not owing to the fault of the plaintiff, but arose from the acts of the defendants. The court agreed with the finding of the experts on this point, but modified the finding on other points. It gave judgment for the plaintiff for $1,885.49, and the costs of suit, on the question of the costs of expertise, plaintiff shall pay one-third of the expenses, and defendants the other two-thirds.

About a year ago the Lyceum Theatre of Eccles, near Manchester, was in course of construction by Messrs. Moore & Sons. The decorative work was a separate contract, and was in the hands of A. R. Dean, Limited, of Birmingham. One of the painters who was engaged on the ceiling fell from the scaffolding to the pit, owing to the failure of one of the planks, and was killed. The widow claimed compensation from her husband's employers, who denied liability on the ground that painting did not come within the scope of the Workmen's Compensation Act, and also because the scaffolding had been erected by Messrs. Moore & Sons, who became responsible. The case was brought into the County Court, and the judge appointed an arbitrator to hear it. The applicant claimed that A. R. Dean were "undertakers" in the sense of section 7, and on the other side the contention was that the work undertaken was not construction within the meaning of the Act. The arbitrator decided that the painters were undertakers, and he awarded the widow £300 damages with costs. The County Court judge, however, set aside the award on the ground that the painting of the ceiling of the theatre was not an employment within the Act. The case was carried to the Court of Appeal. Lord Justice Smith said there was no doubt deceased was employed on a building within the Act, and that whoever undertook the construction of a substantial part of such a building was an undertaker. The applicant was therefore

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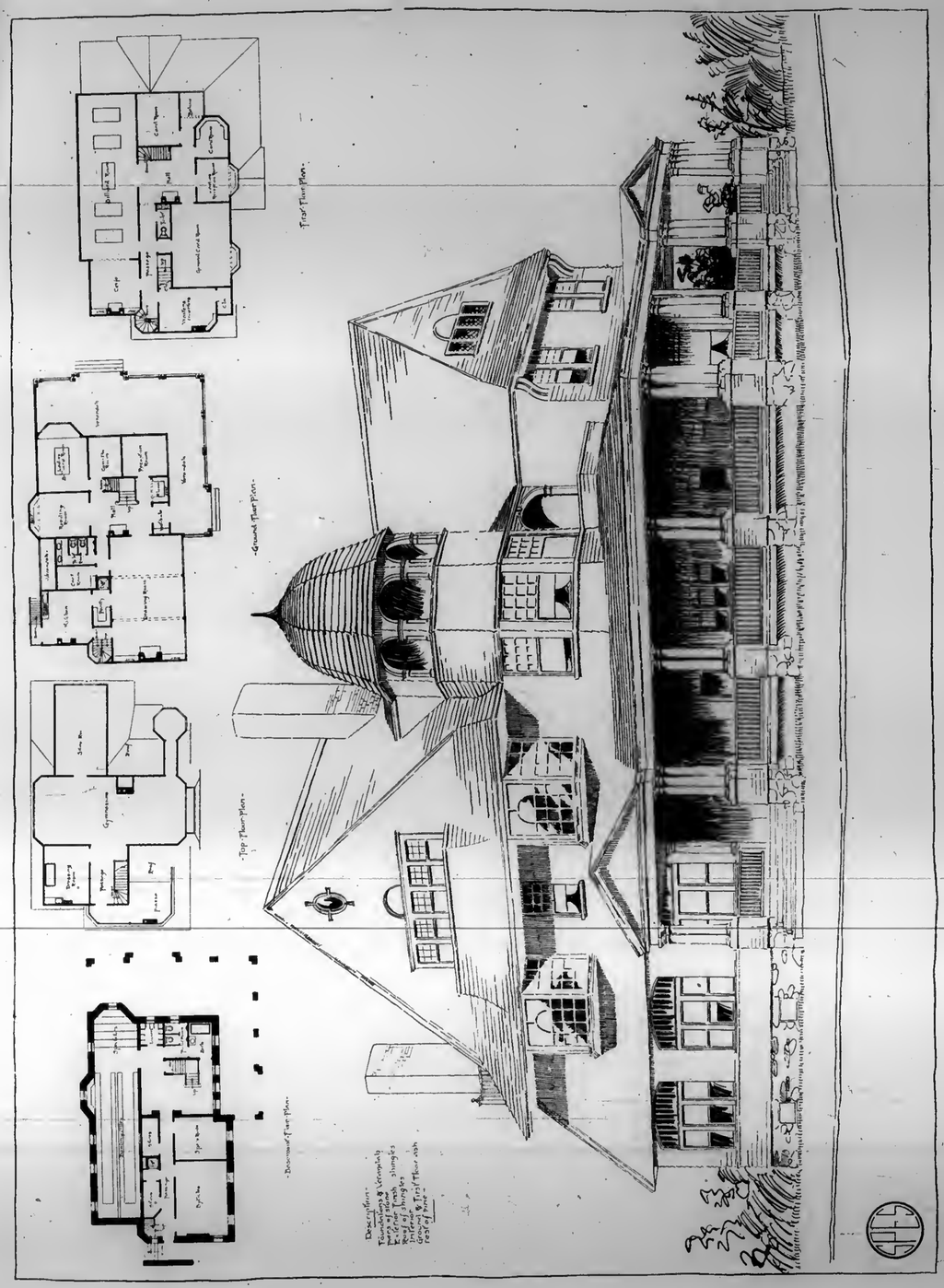

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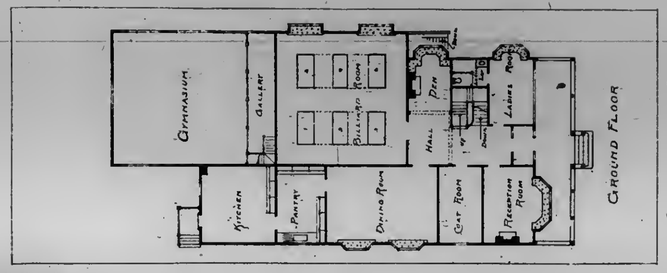

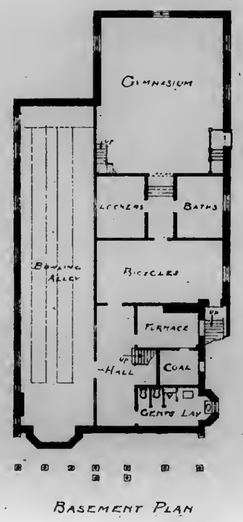

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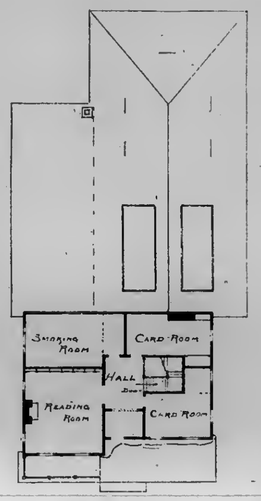

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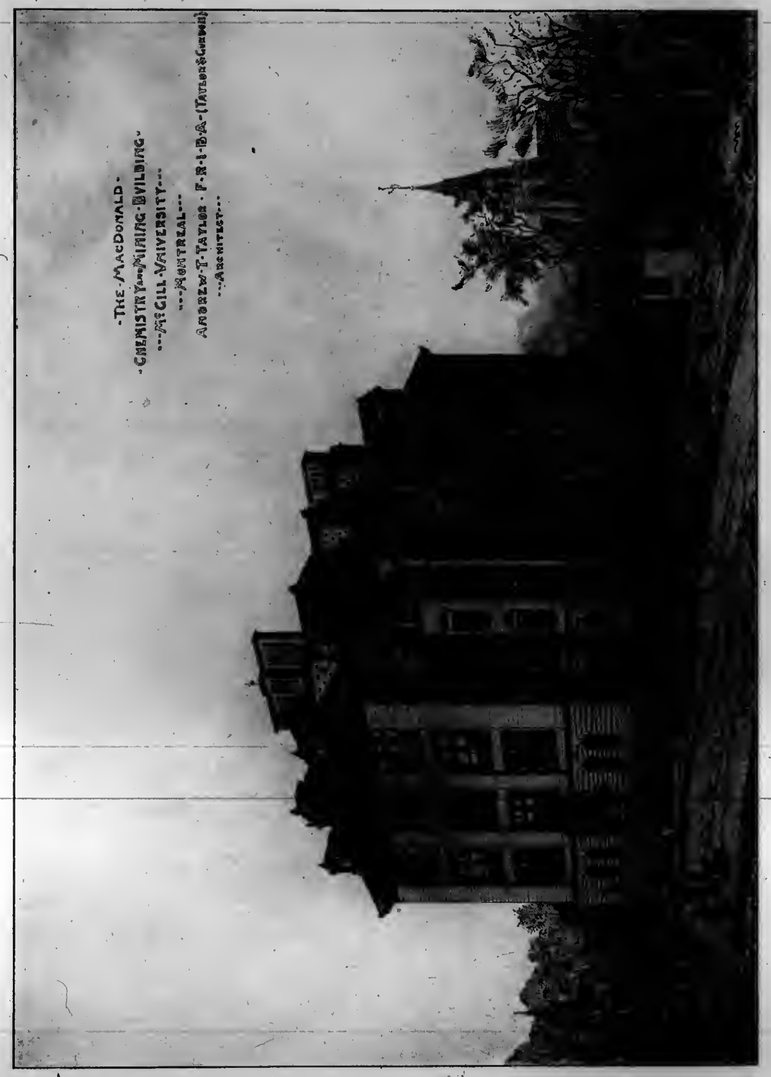
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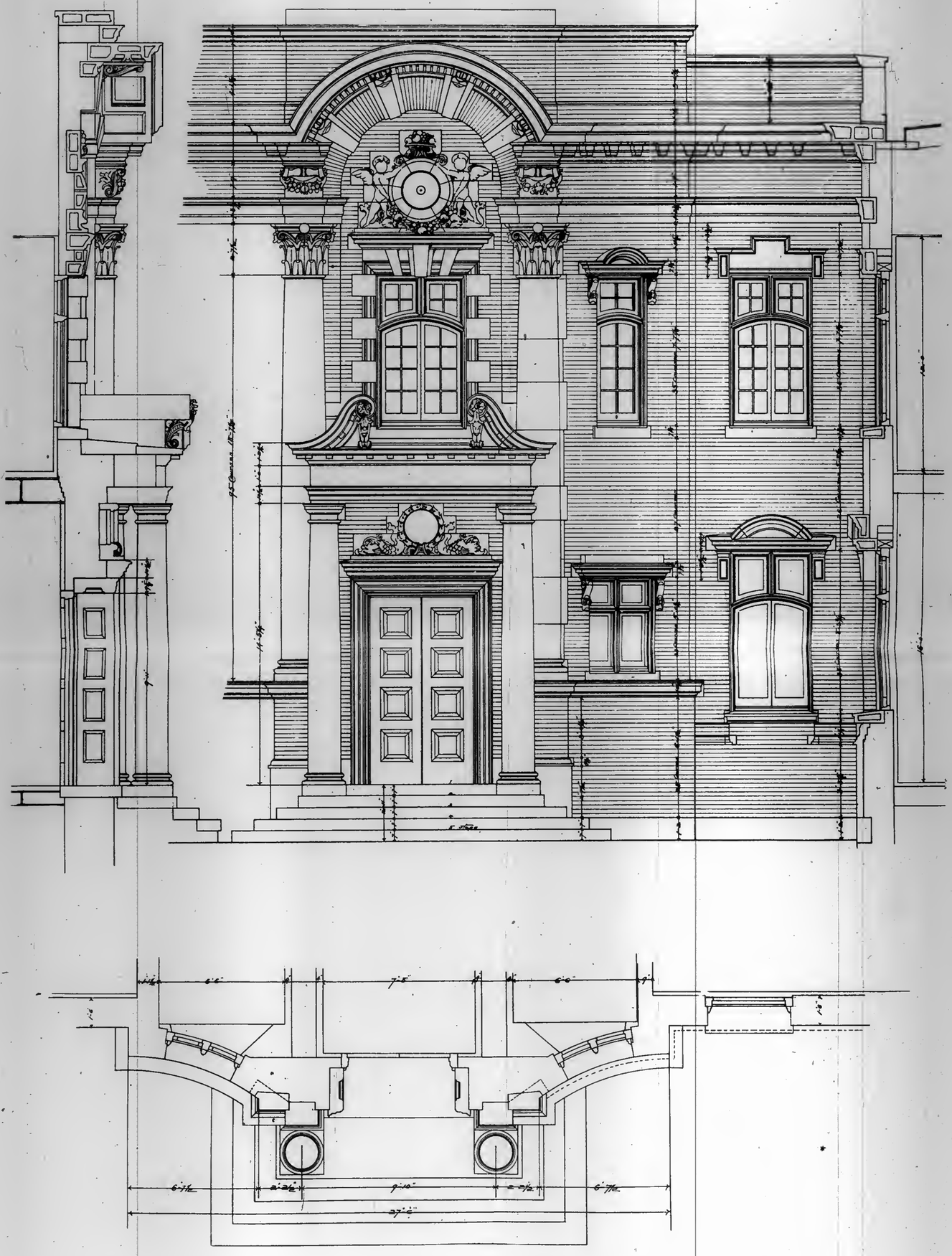

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CANADIAN ARCHITECT AND BUILDER.

VOL. XIII.—No 4. APRIL, 1900 { PRICE 20 CENTS. $2.00 PER YEAR.

—THE—

CANADIAN ARCHITECT AND BUILDER.

A Monthly Journal of Modern Constructive Methods,

(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD).
PUBLISHED ON THE THIRD WEDNESDAY IN EACH MONTH IN THE INTEREST OF

ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

The C. H. MORTIMER PUBLISHING CO. of Toronto, Limited,
Publishers,
Confederation Life Building, - TORONTO, CANADA.
Telephone 2362.
Branch Office: NEW YORK LIFE INSURANCE BUILDING, MONTREAL.
Bell Telephone 2299.

SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to foreign subscribers is $2.50. Subscriptions are payable in advance. The Journal will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrears of subscription paid.

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Workmen's Compensation.

IN consequence of the introduction of a bill in the Ontario Legislature last year, framed on the principles of the recent English Workmen's Compensation Act, Professor Mavor, of the University of Toronto, was commissioned to make enquiries upon the subject, when in England last summer, and present a report. The report, which is now ready, examines the working of laws relating to the subject in all the countries of Europe, and so far as any definite conclusion is suggested, points out the wisdom of waiting for some time "in order to ascertain more fully what has been the effect of the change of principle in the English laws, and to ascertain also whether further change in the direction of the German legislation or otherwise be not imminent in England." Amendments to the English act are already found to be indispensable. The new English act is based upon the old principle of employer's liability, with an "inversion of proof" which presses more heavily than before upon the employer. The presumption, which was formerly in favour of the employer, making it necessary for the workman to prove his claim for compensation, is now on the side of the workman; so that the mere fact of his having been injured while doing the employer's work, entitles him to compensation from the employer, unless the latter can prove that the injury was the consequence of "serious and wilful misconduct" on the part of the workman. The idea at the bottom of the original act was that by making accidents costly they would be prevented; but there is danger in making them too costly. The risk is too great to leave uninsured, and, if insured, the cost is already incurred and the motive to prevent accidents is gone. On the other hand, the

burden of insurance is too great for a small concern. The rates are high, as much as ½ per cent. on the wages; and a small industry in which the annual wages amount to ten times the capital—an ordinary proportion—will have to pay an insurance rate amounting to 5 per cent. of the capital. An uninsured accident might wipe out the capital, and to insure is practically to occupy the capital; the Act is discouraging to small industries. It is for this reason, no doubt, that Prof. Mavor's report suggests the possibility of amendments to the act in the direction of German legislation. There the workman is compelled by law to contribute something himself towards the fund from which his compensation for injury is derived. The State has made sick clubs and other existing benevolent societies a part of its machinery, and compels both the workman and the employer to contribute, on the basis of wages, to these institutions. This has a somewhat socialistic appearance, but the essence of the matter—to secure compensation to the workman—can only be carried out thoroughly in some such manner; for only to give the workman facilities for a civil suit is to still leave compensation uncertain as long as there is the possibility of an insolvent defendant. It might do to combine with the English principle the French method which guarantees compensation by the State to an injured workman, leaving the State to recover from the employer if it can.

Dangerous Cesspools.

THERE is danger impending in the Balmy Beach neighborhood, on the east of Toronto, because of the practice of building bottomless cesspools in close proximity to wells. The country in this part is full of springs. There is apparently a bed of clay under the whole neighborhood sloping towards the lake, and along this is spread a sheet of water soaking along from the level four or five miles back to the level of the lake. Every gully has a spring, and it is easy to tap the supply anywhere by sinking a well for twenty feet or so. Upon these springs and wells the district depends for water, and the danger of perforating the surface also with leaking cesspools is obvious. The individual householder, when this is pointed out to him, seeing that only a general agreement will do any good even if the damage is not already done, declines to trouble himself with a tight cesspool, but puts in an open one—on the lake side of his own well—and trusts to luck and the speedy introduction of city water.

A Work for the Guild of Civic Art.

IT is time that the Toronto Guild of Civic Art made its voice heard. It is not only in carrying out works that an advisory body of this kind is necessary. There are continually projects in the air which want an impulse either for help or hindrance in the early stages of consideration. By the time a scheme gets to the point of execution there is nothing to be done but make the best of it; too much has been done to stop, whether it is a case of municipal action or of an inaction which has allowed private works to proceed and spoil an opportunity that might have been used for the public benefit. A body like the Guild of Civic Art which has no interest in public improvements but the public interest ought to express itself so as to formulate public opinion. The impulse towards public improvements should not be left to come from persons whose private business is served by making the improvement. Conspicuous improvements can, however, be left to take care of themselves better than the humble opportunities that are lost every day from inaction. A few years ago the corners of King and Yonge Street, Toronto, the north corners at least, might easily have been truncated so as to relieve the crowding of traffic and foot passengers at that point. Quite recently, since the establishment of the Guild of Civic Art, a permanent square cornered building has been planted on the north-west corner so as to bar that improvement. The same may be said as to the south-west corner of Yonge and Queen streets, which is becoming more crowded every year. The Victoria Square idea deserves some thought; but who is giving it thought? It was understood that the building of the Bryant Press was a bar to the project, as it was a good building. Now the Bryant Press building has been gutted by fire and there is no good building. It is now or never that the question must be settled. It is a financial question, but all the more for that reason will the Guild of Civic Art, which numbers among its members some prominent financial and business men, be listened to with respect, whichever way it inclines. The question of street cars through the Park is beginning to loom; that is to say, to an outsider it presents this appearance, but from the inner point of view it may be settlement that is looming. If public opinion is not quite clear upon the subject, the man who is clear that he wants to get the cars there will have what he wants established before the rest of the public knows what is happening. It may no doubt be assumed that every, or nearly every, proposed improvement has a good reason at its back, but in carrying it out some thought is necessary to make it serve beauty as well as convenience. Here is the field for a body which concerns itself with the beauty of the city. There ought to be in all cities a body of this kind to form public opinion, but it should be active.

Co-operation in the design of a London Street.

LONDON is to have a new street driven through from Holborn southward to the Strand. It is to be a street 100 feet wide, which, as it nears the Strand, will bifurcate, forming two branches each as wide as the original street. One branch will enter the Strand opposite to the approach to Waterloo bridge, the other at St. Clement Danes church, about a quarter of a mile further east, and the Strand between these two points is to be widened. The two branch streets will form a crescent, and, as the report of the London County Council states, "the land between this crescent and the Strand will form a most valuable building site." "To obtain the full value of this land," the report proceeds, "it is of the utmost importance that every regard should be had to the architectural features of the elevations of the buildings to front the new street, the crescent road, and the Strand." The Council accordingly advise the appointment of eight architects, four chosen by the Council and four by the Royal Institute of British Architects, who will be paid £150 each to submit a rather formidable list of drawings, consisting of 1/32 inch scale elevations of street fronts something more than a mile long and 80 feet high to the cornice, with ⅛ inch scale elevations also for about a third of it, sufficient sections to the same scale, and a bird's eye view if desired. The thing aimed at is harmony rather than similarity; and the style suggested is Palladian, freely treated and of a simple character, suitable to buildings which may be intended for commercial purposes. The Council has shown wisdom in rejecting

suggestions to make the competition open, without limit to the number of designs and with a premium only for the best design. They decided that if the competition were open they would probably lose the chance of the services of leading men, which by inviting a limited number they will probably obtain.

If the County Council would go a step further and invite the selected architects to co-operate instead of to compete, and should choose them with a view to this end, there would probably be a still greater security for the success of the scheme. This is not now a new idea on this side of the water. The grounds and buildings of the Chicago Exposition were planned by a number of men working in harmony and carried out in detail by individual effort; each man designing his own building, in conformity with certain fixed standards of cornice height, etc. The success of this effort impressed the architectural profession of the country at the time, and may perhaps have had something to do with establishing the co-operation, and very successful co-operation, of Messrs. Cope & Stewardson, Wilson Eyre, jr., and Frank Miiles Day and brother, as designers of the Museum of Science and Art for the University of Pennsylvania. The result is a building of extraordinary excellence. Here the design is one, though there are many parts. In street design harmony only is required, and several hands with a common aim should be the very condition of success. There is some chance of a group of public buildings being erected by co-operation in Cleveland, in consequence of the efforts of the Cleveland Architectural Club. A government building, a city hall, a public library, and a county court-house and jail, all to be erected in the next few years and all apparently under the control of the same board, is an obvious opportunity for grouping, but when the idea is once received such opportunities appear to be more frequent than had before been thought. The American professional journals appear to look not so much to municipal enactions as to intelligent co-operation among architects for the redemption of big cities from want of character, and if any occasion comes such as has arisen in London, there is no doubt that this continual talk about co-operative design will bear fruit in the substitution of co-operation for competition. The London County Council have the matter in their own hands. They have only to appoint and the thing is done, for it is not likely that the R. I. B. A., which in its meetings promotes such free and enthusiastic discussion of questions of design, will not be able to produce eight good designers who can work together in generous co-operation.

EASTERN ART.

THE most essential difference between Oriental and Wertern art is that in the East the people decorate the great, and in the West the small. Oriental grandeur consists in the magnificence of cities, gardens, and great sweeps of surface; whereas Western æstheticism delights in the details of statuary, canvas, plaques, and tidies. The East gave a wider sweep to the imagination. Sky and mountains were the nature which most interested the people, and not the shady nooks and frost-crystals. The shepherds of the Syrian plains, watching their flocks by night under the great dome of the heavens, watched at the same time the flocks of stars and the clouds that rolled above them, and the habitual sight of such things gave them a taste for magnificence. Looking at the great rather than the small, and looking up rather than down, they developed astronomy as the first science, and studied the heavens before they knew much about the earth, leaving geology and the other terrestrial sciences to be developed by the Western peoples. They sought for the same reason to learn about God before they new much about man, contemplating the science of theology before that of anthropology and sociology was begun. In their fondness for universals they speculated as philosophers before they observed as scientists, so that the world as a whole was known before its parts, and cosmologies and theories of the universe engaged their attention as fit companions for the grandeur of their artistic conceptions. The East early learned to commune with the great, and hence magnificence was its first product. A people which sees nothing less than mountains and skies cannot be content with the petty in art. Wild flights like those of the eagle and the lightning are more native to them. Like ths Swiss and the Scotch, the highlanders of Palestine and Chaldea inherited a bold and free soul, and their imaginations were no tamer than the chamois which sported among the cliffs or the spirit of liberty there.

WEATHERCOCKS.

As the general use of the term weathercock might lead us to suppose, the form most frequently adopted for the flat plate, whose surface is exposed to the wind, is that of the cock. Those who think every detail in Gothic architecture typical assert this represents the cock that crowed on the occasion of St. Peter's denial. Pennons, banners, arrows, crests, representing various animals, are also frequently used. Small as these objects appear when viewed from the ground, they are often of considerable size. The highest finial on the Royal Courts of Justice, for instance, is really not less than 37 ft. in length, including the portion inserted into the fleche for security, and it weighs about three tons and a half. It has an ornamental ball at the base about 6 ft. 6 in. in diameter, with spikes 12 in. long, standing out all around it, four ornamental braces, which clip this ball and run down four sides of the fleche, and an open-work cross which measures about 7 ft. from point to point at the top, with a "cage piece" above it which is 3 ft. 6 in. in diameter. The chief material used in its consfruction is gun metal, though a main stem passing inside the gun metal tube, and for 20 ft. down into the fleche to hold it fast, is of wrought iron. On the tower below are eight small vanes, banner-shaped, and also made of gun metal, which welgh about 3 cwt. each. There are eight small flag or banner vanes on the pinnacles at the corners of the two large towers of Westminster Abbey. These are also made in gun metal, and each weighs about 1½ cwt. They are about 4 ft. 6 in. in height, and each forms a lightning conductor, being furnished with a copper band, which is carried down the tower. The vane with the gilded cock on the spire of All Saints church, Margaret street, is about 15 ft. in height, and weighs about 8 cwt. On West Vale Church, Halifax, there is a copper vane in the form of a cock. This bird measures 2 ft. 6 in. from beak to tail, though it looks little more than a bright speck from the ground, and the standard or rod on which it is placed, with its double cross and cardinal points, weighs 12 cwt., and measures about 15 ft. in height.

Queenston, Ont.—Sketched by A. A. Martin.

TORONTO CHAPTER OF ARCHITECTS.

A MEETING of the Toronto Chapter of the Ontario Association of Architects was held at McConkey's on March 20th, at which there were present as guests several members of the Eighteen Club. The proceedings partook of a social and informal character. There was some discussion on the Travelling Exhibition as inaugurated at the national convention of architectural societies held at Cleveland in June, 1899. It is proposed to make an effort to obtain this exhibition for Toronto in 1901, the members of the Chapter agreeing to join with the Eighteen Club in this movement.

Mr. J. Wilson Gray read a paper on "Modern Architecture" which had been presented before the Chicago Architectural Club by Mr. G. R. Dean. Mr. Gray stated that, although questioning the motto of "Progress before Precedent", as advocated by Mr. Dean, he regarded the paper as of much interest. Some discussion followed. The paper is published below.

A letter was read from the Plasterers' Union asking if the Architects' Association would receive a deputation from the Union to explain their views on the question of painters putting up staff work. It was decided to request the Union to present their views on the question in writing.

Mr. W. A. Langton tendered his resignation as representative of the Association on the Toronto Technical School Board, and Mr. F. S. Baker was appointed as his successor.

MODERN ARCHITECTURE.*

BY GEORGE R. DEAN.

THE term modern architecture may be variously applied. For the purpose of this paper I wish to limit it to its strictest meaning. When we speak of modern painting we refer to method rather than to time; it is in this sense that I desire to put the subject before you. That we may arrive at our position to-day it will be necessary to review the history of architecture in so far as other nations have had, at their time, a modern architecture.

Primitive man constructed for himself a shelter to in part shield him from the element which, in his climate, was his especial discomfort, or to protect him from his especial danger. The materials were such as, with his limited power, he could best and most easily put together. As he possessed more knowledge, as he became more co-operative, with his added force, he used stronger materials. He passed easily from the pliant reed to the sturdy forest tree—from the mud hut to the stone fortress. This material he found in nature; this material he used, naturally, as he found it. As his mind developed, he called to his aid science, which is knowledge. This he applied to his construction; with the aid of machines he moved larger massss and constructed strongor edifices. There were no limitations, except the limits of his knowledge and power.

This simple growth went on—the art following the development of the people, logical in the use of its materials, and conforming to the wants of man, growing in strength and beauty as the race gained power—as different in one race as its climate or needs differed from another's. This law controlled until the fifteenth century.

Let us return to primitive man and follow the decoration he applied to this construction. As he developed more fully, as he acquired more easily the necessities and comforts of life, he had more leisure for the ornamentation of his shelter. Actuated by the inborn love of beauty, stirred up by the desire to show his position among his fellows, stimulated by his ambition to outdo his neighbors, this ornamentation increased, in quality first and quantity second, until he arrived at what we call his best period. It is that period which produced the highest in art, the grandest in literature, the most just laws and the greatest physical condition of the race. From this point the ornament increased in quantity and decreased in quality as the race became more ostentatious—as it sought new or novel effects y weaker in blood as it forsook the laws of nature, which, by observing, it had built itself up, until, corrupt and degenerate, it was swallowed up by a race of later development.

What was this ornament? In general, one may say of any ancient race: Bring me what it loved and I will construct for you its ornament. The peaceful agricultural race took its ornament from the field and the domestic animals. The race that lived by hunting took its ornament from the native fauna and the animals used in the chase; the warlike, from its victories, the religious from its gods. In each race are all these, in about the ration of their prominence in the race.

Much time has been spent in trying to discover a chain of ornament to prove that all architecture has been dependent on that gone before. Books have been written to show how the ornament of one nation has been introduced by another. Since everything done has its nfluence on what follows, there is necessarily something true in this development of one style from another. Certainly it is true of those styles which have been imported, which, although called by other names, are simply continuations of former styles; but in what may be called "vital styles" this influence is very much overestimated.

The fact that an ornament is similar in two countries does not prove that one is copied from another; similar conditions produce similar results. The fact that only such ornament as applied to its conditions was retained in any race if imported, is strong proof that it might as easily have been originated, for it shows the discerning power of the race and the love it had for a logical ornament as well as for a logical construction. For the purposes of our line of thought it matters not how this ornament was obtained. The fact remains that the ornament used was an ornament which appealed to those who viewed it—that it was vital, in the life, and of the life, of the people; it was the conventionalization of what they saw and loved in their daily life, or what touched them deeply in their history or religion.

If we look into the ornament of any of the great vital styles, this truth is forced upon us.

The Egyptian's tomb was his religion; on it he recorded his life — portraits of himself and family, representations of his gods, scenes in his life and home, his domestic animals, his horses and chariot. In the purely decorative portions he used his native flowers, notably the lotus, his national flower—the flower with which he approached his gods and with which he crowned himself at his feasts.

Architecture was the only art considered worthy of the upper class; for this reason there was no sculpture, as we use the term. It was all subservient to architecture, and adorned it. That the architectural scheme might not be destroyed, the sculpture was deeply conventionalized; realism being thus eliminated, feeling or the essence of the subject sculptured was developed to a wonderful degree, and the Egyptian has left to us the finest examples of the idealization of animal forms that any age has produced.

The Persian, through his love for the chase, adorned his architecture with hunting scenes and the native wild flowers. That the sculptor knew well his subject, there can be no doubt. The majesty of the lion and the swiftness of the greyhound are drawn with equal power and truth to nature, the conventionalization eliminating all except that quality which was the dominant one. Of the flora, we find principally the rose and the lotus. Persia is the land of roses—nowhere else do they attain such glorious perfection. The lotus was native to the soil and held in religious veneration.

If we accept the position that architecture and architectural forms passed from Egypt to Persia and Greece, it is interesting to note that the lotus, which the Persian knew and admired, continued to hold a prominent place; while in Greece, where it was not, except in one inferior variety, it was soon lost as a flower,

*Paper read before the Chicago Architectural Club.

though it may have exerted a strong influence in determining some of the architectural forms.

The Greeks were a race peculiar, in that they were in a sense without a native land. They lived in the acts of their ancestors, and wherever they settled, even after many generations, were more loyal to their ancient heroes than to the land of their birth. Their Bible was the Iliad and Odyssey. In their early ornament, the greater part is the representation of scenes in the lives of their deified heroes. In most cases the sculptured ornament refers directly to the purposes of the building. In the purely decorative portions we find the native plants, especially the palm which grew in the neighborhood. It is found throughout their architecture, and used much the same as the Egyptians used the lotus. Although the palm has religious and historical interest for the Greeks, it is not safe to say that it was used on this account alone, for we find other plants almost, if not quite, as common, such as the honeysuckle and acanthus, which appear to have had little signification.

The essential property of the Greek ornament is its national and contemporaneous character. Everything was in artistic keeping with the life and dress of the people who stood about it. There was no attempt to resort to novelty by depicting the animals or dress of other nations. It was the Greek's idea of the "eternal fitness of things" which made his architecture what it is. The ornament is much more realistic than the Egyptian's, principally by reason of the high esteem in which the art was held. Since the sculptor was equal with the architect, his work took equal part with it, and the building was asmuch a pedestal on which to place the ornament as the ornament was the adorning of the building.

If we take a long step and consider the Gothic, we will have before us, perhaps, the latest vital style. The Gothic has been traced by the architectural historian directly from the classic. From his point of view, this is doubtless true. But, so rapid and thorough was the eliminating process carried on, that in its best period we find them absolutely dissimilar in form and feeling. The people were a religious race—probably as intensely so as any the world has ever seen. Its pictorial ornament was its religion; its floral decoration was the nature taken from its gardens and fields. Anything capable of decorative form was thought worthy of a place on its most glorious edifices. In many cases the ornament does not appear to have had especial sigoification, and yet the flower language at that time was so highly developed that exhaustive study might bring out very interesting results. In some cases the application is very marked, as the use of the lily, a flower dedicated to the Virgin, in the lady chapels in the twelfth and thirteenth centuries, and from that time becoming a striking architectural decoration.

An interesting application of our subject is in the use of the palm in Gothic. We find it in very early work in its classical form; not existing in nature in the country. It soon disappeared and was suddenly revived when the Crusaders returned, bringing large quantities from the Holy Land.

If we study the history of painting and sculpture, we will find this same steady growth, and with architecture we will find them at a standstill in the fifteenth century. This sudden change in the artistic world must have been caused by some great power which had a direct influence on the creators. We will find it at the exact period where we should expect it. That the decline of the art began with the invention of the printing press is no mere coincidence—one is the direct result of the other. A great and sudden impetus was given literature by this acquisition. The great minds of the day pressed into the field. All the great works of antiquity were described and put into concise form. Not content with this, literature proceeded to lay down rules for their imitation. She dictated the colors to be used in painting; she insisted that the sculptor should pose his models thus and so, or copy those things done before; she laid down laws for science and forbade investigation in certain lines; she furnished a set of measurements for architects—not in general, but to the width of a line for every portion of every building.

For three hundred years all progress in the arts was stopped. Painters spent their time copying work better done before, or putting into the eye of man that which had already been done by the ear. Architects, most deludedof all, reared buildings from descriptions and covered them with decoration, the originals of which in nature they had never seen. Since that time, each young mind, full ot a desire to interpret the great truths which have come to him as, in communion with her, he has drunk in the beauties of nature, has been forced to have his senses blunted, his imaginations drowned, his very talents stunted, by a constant repetition of forms he does not understand, the originals of which in nature he has never seen, and which in maturer years he admits to himself are essentially bad. Within this century the other arts have one by one returned to the great mother, nature, for inspiration.

If space permitted, it would be interesting to follow the emancipation of the various arts from the rules and limitations so long accepted; the conflict has been very similar in each, and one will answer as an example. Early in this century the illustrators for comic and other papers, through the necessities of their vocation and through their observations of nature, showed to others something of what might be done with contemporary life. This phase of art was taken up and followed by the "Little Masters," so called, who were men without much training, and had little to lose in the then correct art. These men produced little of value, principally because of their lack of mental vigor and training. Men of ability, until Delacroix, followed the accepted canons of art. Delacroix, the leader of the Romanticists, broke away from the classic school, yet with his followers took his subjects almost entirely from literature.

David, the opponent of Delacroix, backed as he was by a great emperor, did much to delay the progress of the new school, and it was left to Millet and the men of his day to depict the life about them and show what beauty nature holds out to those who love her. Color, however, was not sought out in the same spirit. The artist recognized that it most cases pure local color produced a colnr scheme crude and unbalanced.

It remained for Manet to discover the subduing and harmonizing effect of atmospheric color. This, in general, was the process of evolution. The names mentioned are given to show the time, rather than the persons, to whom we are indebted, for in all evolution each one striving for truth will produce something to make up the advance. It is no longer necessary for our sculptors and painters to dress our statesmen in Roman togas nor our soldiers in coats of mail to indicate wherein they serve the people. Artists have a more subtle method of transmitting thought.

The true artist receives into his soul a feeling; if he can transmit this feeling to another, his mission has not been in vain. This is the true value of art. Without this carrying power the work is worthless from an artistic standpoint. It may be true and serve its purpose as history. How this feeling is reproduced we know not, nor shall we know until the laws of hypnotism and other psychical phenomena are understood. We do know that it cannot exist, except it first existed in the artist. No rules are of any avail. In all the arts, except architecture, these things are accepted. In them the artists have passed the debatable ground and are working together in a new and rich field. That the public is awakening, there is no longer doubt. It responds to the thrilling chords of modern music; it crowds our art galleries, it fills our libraries. That "one touch of nature which makes the whole world kin" is fast making it an intelligent, discerning and receptive one.

Let us now take up the parallel of architecture. Architectural literature has led architecture since the fifteenth century. The premises, as we have seen, were not correct, however logically may have been the course followed since; the position now arrived at is beyond comprehension. Go where you will in our country and in every city, you will find men at work cutting holes in the facades of buildings built after the best architectural textbooks; so universal is this practice, that more than one-half of the large buildings have undergone this operation and a large proportion of the remainder are tenantless. Year after year architects rear buildings, pointing out their archæological beauites, and science follows close behind with a sledge-hammer and makes a wreck of the archæological part of them. So evident is this that the people now demand and are receiving a logical construction. The architect recognizes the necessity, and clings to ancient construction solely that he may employ ancient ornament. This he distorts out of all proportion in order to form a compromise with a useful construction. Constantly dissatisfied with the results, flits from style to style.

Just now the Renaissance is in vogue, and the Davids of architecture are taking the bright minds from the hotbed of America and shutting them up in the refrigerator of all progress—Italy, a country which never developed a style; a country where each style, being imported, began at its best and rapidly degenerated. Nature, that great storehouse of artistic supply, never furnished nourishment for the Renaissance style; except at the first, where it appears to have taken its inspiration directly from the Greek, it is a book architecture nourished by the dogmas of Vitruvius.

For four hundred years we have choked in our efforts to suck

blood from dry bones. How long shall we continue, and what are the influences which hold us from the fat and marrow? To-day the evil, especially in America, is the architectural school. The instructors are not architects. The pupils have too much instruction and too little guiding. Their minds are crammed with a knowledge which will prevent the natural growth of any problem which may confront them. The development of the memory is forced; but the mind, like the source of its supply, the Roman ruin, is left overgrown with acanthus weeds and blocked with egg and dart moldings. Why spend years learning the steps by which the Gothic passed from the Greek, when the essential quality of its art is in the fact that it got rid of the Greek, and not that it retained any of the Greek influence? If we can imagine a medical school where none of the instructors is or ever has been a practicing physician, with the writings of Claudius Galen for a text-book, we will have a just comparison.

The painter no longer paints in the Renaissance or Byzantine style as he did fifty years ago. He paints in his own style, and we now begin to hear of the American style or school, which means simply that he paints as an American sees America, with an American's pride and patriotism. When an American builds as an American sees America, then and not until then will we have an American style.

If we cease to try to express character by the use of different styles, a method which is now universally adopted—a method which is governed by association, the lowest form of expression—if we throw off the yoke of precedent and stop copying the works of other nations and other times, if we form an American style, what will it be? If we judge of our future by the works of those nations who recognize no architectural rules, the new American style is clear. We will never have a great ecclesiastical decoration; the Protestant church is against the use of pictorial symbols. We will never have a great historical style in the sense the Greeks possessed it; we are not hero worshippers. We may not record the acts of ourselves nor our contemporaries, as did the Egyptians. First and foremost we are an agricultural people. We love flowers and foliage plants. We inherit a taste for the woods and chase. We are a manufacturing people. We are interested in our history and in the sciences. We take comfort in our religion. We may, then, expect a decoration evolved from these subjects in the proportion of their prominence. Owing to our love of novelty and our inventive genius, we will not develop one line, but will use whatever we find in any which contains decorative quality. We will not continue to use in building after building one or two plants, as did the Egyptian or the Persian, but, like the builders in the Gothic period, choose for ourselves those things which best express the character we seek.

We will have a colored architecture, for we, as a nation, love color. We who hold the painter and sculptor in high esteem will evolve an architecture which will give them the opportunities that they so rightly deserve. It is now impossible for a modern painter to place himself in the spirit of painting what would harmonize with any of the ancient styles of architecture. There are, at present, technical difficulties to overcome. It is necessary, in order to produce the numerous complicated drawings which constitute the plans of a building in the time allotted by our rapid age, not to mention the economy required to prevent financial failure, to observe a system. This condition is not, however, prohibitory to the forming of a new style, for it has been successfully overcome in many large and notable buildings.

If the schools would develop the true designing power of our pupils, and train them in the conventionalizing of natural forms, the step would be an easy one. There is no field of artistic study so open to success as this one, for this architecture is sure to come; it is now well under way. We are now in the transitiona period. Modern thought is showing itself here and there on our public buildings. Here and there, in domestic architecture, a frieze, a mantel facing or a stained-glass window is designed and executed in decorative character without the use of precedent, and with nature as the model. On the exterior of the new Congressional Library at Washington are carved, with great truth, typical heads of all the different races. Not only is this of far greater interest than the repetition of so many lion heads, but it is a valuable record in stone of the world's position to-day. At the entrance and in the rotunda of the Marquette Building, in Chicago, we have excellent examples of this new style. The Auditorium Hotel is filled with frescoes representative of American life. In nearly every building some of the art has forced itself in.

The Columbian Exposition was full of American art in spite of the understanding among the architects that the work should all be classic. The Court of Honor was full of American ornament. So thoroughly was this ornament conventionalized and ennobled by eliminating all except the highest quality, that it held its place well with the best productions of classic art. Had the Fair been held ten years earlier, two huge lions would have taken the places of the charming statues of Plenty and Industry. Had this feeling been carried throughout, we should have shown to the world that we are independent leaders in art as well as in the sciences. As it is, we have shown a beginning and given a foretaste of what our architecture will be when we again put ourselves on exhibition before the nations of Europe.

ONTARIO ASSOCIATION OF ARCHITECTS.

The Council of this Association, as empowered by the convention, has prepared a tariff of professional charges, which is now being printed for distribution. It has also been arranged that each member shall receive a number of copies as soon as they are ready. The tariff is printed below. It is based upon that of the American Institute of Architects, and thus endorsed by the practice of the leading body of architects in America.

The rooms of the Association in Toronto will not be opened until September, but committees have been formed to arrange for monthly meetings and classes, and the question of a suitable opening will also be considered. An Educational Committee has been appointed which will consider the whole question of education of students in technical subjects and design, and make arrangements for this work next winter. In this connection the council is desirous of having every member comply with the requirements of the Ontario Architects' Act, which requires the registration of students.

The library is still in the office of Mr. W. A. Langton, Canada Life building, and he has kindly consented to act as librarian until the new rooms are ready for occupancy.

Mr. A. M. Weir has passed the second examination with a percentage of marks which would entitle him to honors in a University examination.

Mr. C. H. C. Wright, instructor in Architecture in the School of Practical Science, and Mr. Fred T. Hodgson, who has long been well known as an editor of architectural journals in the United States, but who is a British subject and permanent resident in Collingwood, have been admitted to membership in this association.

ONTARIO ASSOCIATION OF ARCHITECTS.

SCHEDULE OF MINIMUM CHARGES—ADOPTED APRIL 14, 1900.

(Based upon the Tariff of the American Institute of Architects.)

1. For full professional services (including supervision) five per cent. upon the cost of the work, excepting that a percentage in excess of this may be charged when the work costs less than a certain sum below which a commission of five per cent. is not remuneration, which sum may be fixed at $5,000 for simple work and $10,000 for work of a more complex character.

2. For factories, warehouses, and other plain work of a like description, a charge of from three to five per cent., according to the nature of the work.

3. For partial service, or in case of the abandonment or suspension of the work, the charge for partial service is as follows: Preliminary studies, one-fifth of the full commission as above. Preliminary studies and general drawings and specifications sufficient for estimate and contract, one-half of the full commission as above. Preliminary studies, general drawings, specifications and details, four-fifths of the full commission as above.

4. For monumental and decorative work, and designs for furniture, a special rate in excess of the above.

5. For alterations and additions, an additional charge to be made, and also an additional charge to be made for surveys and measurements incident thereto.

6. An additional charge to be made for alterations and additions, in contracts and plans, which will be valued in proportion to the additional time and service employed.

7. Necessary travelling expenses to be paid by the client.

8. Time spent by the architect in visiting for professional consultation, and in the accompanying travel, whether by day or night, will be charged for, whether or not any commission, either for office work or supervising work, is given.

9. The architect's payments are successively due as his work is completed, in the order of the above classifications.

10. Until an actual estimate is received, the charges are based on the proposed cost of the works, and the payments are received as installments of the entire fee, which is based upon the actual cost.

11. The architect bases his professional charge upon the entire cost to the owner of the building, when completed, including all the fixtures necessary to render it fit for occupation, and is entitled to extra compensation for furniture or other articles designed or purchased by the architect.

12. If any material or work used in the construction of the building be already upon the ground, or come into the possession of the owner without expense to him, the value of said material or work is to be added to the sum actually expended upon the building before the architect's commission is computed.

SUPERVISION OF WORKS.

13. The supervision or superintendence of an architect (as distinguished from the continuous personal superintendence which may be secured by the employment of a clerk of the works) means such inspection by the architect, or his deputy, of a building or other work in process of erection, completion or alteration as he finds necessary to ascertain whether it is being executed in conformity with his designs and specifications or directions, and to enable him to decide when the successive installments or payments provided for in the contract or agreement are due or payable. He is to determine in constructive emergencies, to order necessary changes, and to define the true intent and meaning of the drawings and specifications, and he has authority to stop the progress of the work and order its removal when not in accordance with them.

CLERK OF THE WORKS.

14. On buildings where it is deemed necessary to employ a clerk of the works, the remuneration of said clerk is to be paid by the owner or owners, in addition to any commission or fees due the architect. The selection or dismissal of the clerk of the works is to be subject to the approval of the architect.

EXTRA SERVICES.

15. Consultation fees for professional advice are to be paid in proportion to the questions involved, at the discretion of the architect.

16. None of the charges above enumerated cover professional or legal services connected with negotiations for site, disputed party walls, right of light, measurement of work, or services incidental to arrangements consequent upon the failure of contractors during the performance of the work. When such services become necessary, they shall be charged for according to the time and trouble involved.

DRAWINGS AND SPECIFICATIONS.

17. Drawings and specifications, as instruments of service, are the property of the architect.

APPOINTMENT OF AN ARCHITECT.

18. The Ontario Association of Architects is of the opinion that a better result is always obtained by the direct appointment of an architect for any given work than by the selection of an architect by the process of competition.

SOLICITING PATRONAGE.

19. The attempt to secure work by offering to prepare sketches or preliminary drawings, or to render full professional services at a less rate of compensation than another architect, is unprofessional conduct.

REMOVAL NOTICE.

On May 1st next the Montreal office of The CANADIAN ARCHITECT AND BUILDER will be removed from the New York Life Building to the Imperial Building, corner St. James Street and Place d'Armes Hill.

Messrs. Darling & Pearson, architects, Toronto, have removed to new offices in the Imperial Bank Building, Leader Lane.

ILLUSTRATIONS.

RESIDENCE FOR MISS M. A. WALLACE, HAMILTON, ONT.—WILLIAM & WALTER STEWART, ARCHITECTS.

SOME OF THE FURNITURE OF THE NIAGARA NAVIGATION COMPANY'S STEAMER "TORONTO" (SELECTED BY THE ARCHITECTS' EIGHTEEN CLUB, TORONTO)—BOND & SMITH, ARCHITECTS.

EXTERIOR AND INTERIOR VIEWS, UNION BANK BUILDING, TORONTO.—BOND & SMITH, ARCHITECTS.

The building was almost an entire reconstruction, only a portion of a wing of the original building being left at the rear. The work was carried out under unusual conditions, the new building being erected while the bank continued its usual business in the rear, and also a firm of lawyers occupied offices above the bank. Temporary entrances had to be arranged and shifted from place to place as the work progressed. It is satisfactory to note that no accident occurred. Another feature of the bank is that the banking room space is unbroken by columns or supports of any kind, the two floors and roof above being carried by a plate girder across a span of 45 feet. The ceiling of the banking room is suspended from this girder by rods. The front is designed in the style of modern French Renaissance, carried out in light buff terra cotta, pressed brick and Indiana limestone. The banking room is finished in quarter cut oak and antique bronze grilles.

SCIENTIFIC PHOTOGRAPHY.

Photographic researches which are now well known have revealed much as to the structure of metals and alloys, but a still further insight as to structure in relation to behaviour has been obtained by Messrs. Ewing and Rosenhain, whose results are embodied in a paper recently communicated to the Royal Society. Most metals, when polished and afterwards slightly etched, reveal a structure, showing that the metal consists mainly of irregular grains, which ordinarily have well-defined boundaries, and these grains, by suitable lighting, can be seen as nodules, with well-marked cystalline facets. The grains are, it would appear, actual cystals, which are deformed by the crowding and crushing together of the various crystal growths. To observe and record the effect of strain on the crystalline grains several methods were adopted, the most usual course being to mount strips of polished and grained metal on the stage of a microscope having photographic attachments, the metal being then strained by the steady and controlled pull of a miniature testing machine. In other cases larger bars were strained by means of a fifty-ton testing machine, the microscope being mounted on the bar itself. The chief results, as shown by the photograph, taken at frequent stages, are as follows: When iron or other metal showing the ordinary granular structure is stretched beyond the limit of elasticity, sharp black lines appear on the crystalline nodules, these lines being substantially straight and parallel on each nodule, but the direction is not the same on all nodules. At first, however, the lines are, for the most part, transverse to the direction of the pull, but as the stretch becomes considerable the more oblique systems of lines develop. If a piece of metal is very considerably strained, a second system of bands appears on some of the nodules, and somtimes a third system. The authors regard the bands as being due to slips occurring in the various cleavage systems of the crystals. The slip bands can be seen quite well if polished, but unetched metal is strained, and although at the outset the nodular structure is not traceable, this structure becomes obvious when the straining proceeds, as the slip bands themselves map out the positions of the nodules. The microscopic slip bands can be developed by straining iron, copper, silver, gold, nickel, bismuth, tin, or brass, a ready means being by pinching a bright button of silver or copper in a vice.

STUDENTS' DEPARTMENT.

ALPHABETS AND PRINTING.*

By H. C. D. CHORLTON.

To trace the evolution of our alphabet from the earliest possible records and through historic times is of great interest and use, but I purpose rather to treat of the arbitrary forms as we now have have them, more particularly dealing with those styles of most utility, and to give you my own ideas respecting their proportions, spacing, and arrangement. The formation of good letters, though seemingly a simple matter, is evidently difficult, seeing that so many hundreds, almost thousands, of variations have been made, yet so few continue to hold the approval of cultivated judgment.

REFINED EH

Elongated refined forms. Want of proportion in thick and thin parts.

I find that among those who have been obsevant of natural forms, and particularly among those who have carefully drawn and studied them, that there is a general unanimity with regard to the proportion of thick and thin parts and the avoidance of mechanical regularity. From the appearances of Nature, according to our individuality, we absorb certain ideas of proportions, such as from a vigorous oak-tree with its strong trunk and boughs, or a graceful birch tree with its tapering, radiating, and delicately curving branches.

EH CAT

Want of variety. Proportion of thick and thin.

A stout piece of humanity has proportionately stout limbs, as a graceful woman has proportionately graceful limbs. Such observations have their beneficial effect on our appreciation of conventional work, and even in our choice of letters.

We ought not only to design well-formed letters, but they should also be suitable for the instrument and material with which they are to be worked. The conditions not only facilitate the work but they give character also. The old Roman letters were cut in hard substances and are consequently angular. The reed pen and stylus made scratchy, monotonous lines. The quill pen, with its delighful flexibility and the different angles at which it could be cut, produced the beautifully-varied forms of the old illustrated MSS., the forerunners of the printer's lower-case forms.

CLAUSE
VSE USE

The first u, which was formerly used as a capital, is preferable. The second V is useful as an angular form among curved letters. The last U is the least desirable form.

Legibility is, of course, the first consideration, and we can secure this by the avoidance of oddities and jerky points and twists of the serifs, and we can get beauty in simple purity of line.

In Roman letters I have always a liking for a generous form not too condensed nor too extended, and for variety in extension; every letter should not fill a square, which would only give a mechanical monotony.

Curved letters should approach a circle or even go beyond it, as in O. Albrecht Durer had a good system for these proportions and for forming the serifs.

If it is desired to use a light letter, I prefer the employment of the double line throughout.

For convenience of space letters may be linked together, but this should be done judiciously so as to avoid loosing legibility or cutting the word into a monogram. Linking should be avoided in words beginning with a capital.

There is some obscurity respecting the origin of a very beautiful form of Irish MSS. in use from the sixth to the ninth century, of which the Book of Kells, now in the Library of Trinity College, Dublin, is the finest example. The capitals are of little use for modern requirements, but a careful study of the small letters

OPEN
OPEN

could not fail to be beneficial, and might be made to form a basis for a good series for present use.

I come now to the question of printing. To my mind, both from a matter of clearness and good appearance, modern types are too thin, too condensed, too much spaced between the lines and between the words, and often to small. The result is a washed-out grey and mechanical appearance in the mass. The fifteenth century printers did very much better.

The rectangular shape of the paper and the necessary lines of words force us in a general way into the acceptance of the panel form for the massing of type. I prefer that the panel may be retained as much as possible.

In a display page the division of words at the end of a line is sometimes awkward, but on some rare occasions I think it is permissible to sacrifice the customary syllabic division to the effect desired. It is only a question whether the artistic or the literary side shall rule, and I think there are occasions when ornate appearance shall be the first consideration and the idea of clear reading quite secondary. These occasions must of course be carefully chosen.

TE LOVE
TO AND

It is not any more difficult to set well-formed than ill-formed types, and cultivation will make good arrangement easy enough. Well-formed type, if well set, may look ornamental even without any added ornament.

Ordinarily we do not sufficiently consider the white paper. We should remember that when we are setting black we are putting it on white, and the proportions one to the other should be considered, and although we are using black ink, the result in appearance may go through grey to solid black.

I like to see the spaces between the words less than is at present customary, and to make them as regular as circumstances will allow; the early printers did this, and never had the objectionable "rivers" in their work. I like to see type set as solid as convenient reading will allow. Long lines are difficult to follow. I like the double columns, and they lend themselves very well to ornamental work.

Borders may be darker than the mass of the type or equal in weight; they rarely look well if they are lighter. We usually set them too far from the type.

Capitals are often the only means of giving relief or accent to a page. We seem to be afraid of using them large. For clearness of reading the Roman are preferable, for that is their strong side, as Gothic is of the lower case. Where clearness is not the great essential, either Roman or Gothic capitals may be used, and either may be ornamented. Always presuming that the run-on matter is in black, the capitals may also be in black or in color. The weight of the capital should be in keeping with the lower-case. If it is in black it ought not to be so heavy as it may be if printed in color, and may be bolder as the color employed is lighter. If two colors are employed, we should be aware of their mingling effect. The colors always seem brighter if used in simple mass or if relieved by a white line.

It is possible to ornament a capital and yet keep the shape of the letter clear, but I do not think that is always necessary. The types should come fairly close to the capitals. It is extremely difficult to ornament a capital with figures or animals. In a piece of display printing I like to keep the unity and to use as few styles of types and even as few sizes of the same type as possible.

Illustrations other than the purely utilitarian should ornament a page as well as be a means to the further comprehension of the subject. They should be in line, and the thickness of line employed should be in keeping with the weight of type. Half-tone photographic reproductions are out of all sympathy with type.

Most commercial work, dictionaries, medical and scientific works, should be entirely free from ornament, so also should works having illustrations of a purely utilitarian character, as any ornament would be sure to be out of keeping with them.

When arranging an ornamental page I always get the lettering right first. If type is to be used it is set first, or if the whole is to be drawn the lettering is decided first, and then the ornament is made in keeping or agreement with it. It is always diffcult to make a pen line agree with type. To be simple in design requires more knowledge, more thought, greater selection, and a higher sense of ornament, than to be elaborate. With such a frank instrument as a pen, it is more difficult to draw a thick than a thin line.

A drawing for photographic reproduction should be very slightly, if any, larger than the intended size, as much reduction destroys the quality of penmanship, and we should always bear in mind that in much reduction heavy black parts still remain black while the lines may be reduced to scratchy fineness, thus producing an exaggerated difference between them.

As letterpress printing is a method of impressing characters by means of raised stamps, it should not have its peculiar quality taken away by hot-rolling the paper afterwards; it takes away the slightly varying surface caused by the impress, and makes the matter look flat on the surface—a result so insipid in lithography.

When looking at a book the two pages are seen together and should bear a relation to each other; the margin in the binding should be narrowest, the head margin larger, the fore margin larger still, and the tail largest of all—this for convenience of handling as well as to avoid the appearance of the pages flying away from each other.

*Read before the Machester Society of Architects, 14th December, 1899, and reprinted from the Journal of the R. I. B. A.

TESTS OF BUILDING MATERIALS.

No. 21 of the British Fire Prevention Committee's publications records the result of a fire test of an hour and a quarter's duration on a floor of steel joists filled in with concerte carried on corrugated iron, with a suspended ceiling of modern joists carried by iron hooks projecting below the concrete floor, and hooked on to the lower flanges of the steel joists, with wire lathing and plates on the under side of the wooden joists. The suspended ceiling fell during the test, and as it is noted that the concerete was slightly distintegrated on the under side, that is what might have been expected considering that, according to the section drawing given, the intermediate supports were by bolts fixed in the lower part of the concrete. This seems to have been a weak point, as it necessitated piercing the corrugated iron, and it is noted that "occasional jets of flame came from between the joints of the corrugated iron centering."

The floor deflected during the test 2 3-4 inches in the center, but subsequently returned to within one inch of level. The corrugated centering and the under side of the steel joists were red hot after the test, but this probably (or almost certainly) would not have occurred if the ceiling had not fallen. The result seems to be adverse to the principle of suspended ceilings, or at all events points to the necessity of better methods of suspension.

No. 22 of series records tests on two lath and plaster partition, one with wood lathing, the other with wire lathing; and on two brick nogged partitions, one with brick flat, the other with brick on edge. Both lath and plaster partitions were practically destroyed, the fire breaking through the wood-lathed one in twenty-eight minutes (1650 deg. Fah.) and through the wire-lathed one in forty minutes (1750 deg. Fah.) At twenty-five minutes after the commencement of the test the wire-lathing on the side next to the fire was bare of plaster and the wire lathing nearly all down. In this respect it showed only six minutes longer life than the wood lathed partition. The brick nogged partitions kept the fire from penetrating up to the end of the test, but the plaster fell from the brick flat partition at thirty-three minutes from the commencement of the test, but not so as to lay bare the brick. The result seems to indicate that plaster stands fire better on brick backing than on lathing, whether wire or wood. It also appears that the brick on edge partitions stood the test as well as, if not better than, the brick-flat one, but this result may probably be regarded as accidental.—London Builder.

Mr. Alex. Cameron, contractor, of Portsmouth, Ont., died last month.

Mr. William McDonald, of Kansas City, Mo., is about to commence business as contractor at Kingsville, Ont.

Mr. F. Deggendorfer and Mr. A. G. Harrison have formed a partnership as architects and civil engineers at Edmonton, N.W.T., under the firm name of Deggendorfer & Harrison.

Mr. W. Reid, contractor, died in Montreal recently, at the advanced age of 82 years. Deceased came to this country from Scotland when quite young, living the most of his life in Montreal.

Queenston, Ont.—Sketched by A. A. Martin.

CODE GOVERNING COMPETITIONS IN DESIGN.

COMPETITIONS, with their invariable unsatisfactory results, have ever been a vexation to architects, who, strange to say, have taken little if any concerted action to rectify the evil, which undoubtedly is their business, if a satisfactory solution of the question is ever to be reached.

The New York Architectural League, the Chicago Architectural Club, and the Philadelphia T Square Club, as well as the National Sculpture Society and the Mural Painters of New York, have approved of a code for governing competitions in design, which was brought before the Convention of the Architectural League of America last June by Mr. J. F. Harder, of the New York Architectural League, in a paper explaining its aims and urging its adoption by all architectural clubs, and concluding with the following reasons for its acceptance :

1. It enters upon the road to reform by taking the first step which must be taken to accomplish anything.

2. It commits the profession to a recognition of certain uniform principles of ethics relating to the subject.

3. It can be immediately applied to such competitions, both private and public, over which clubs have control, and in some cases where the executive of clubs is officially consulted.

4. It establishes a standard by comparing which with an issued program, professional men will be able to decide whether it is advisable to enter or desist from a proposed competition, and provides the reason therefor.

5. It places a club in a position to announce to its members or publicly state whether it approves or disapproves of the terms and conditions of a proposed competition and to state reason therefor.

The Convention adopted a resolution recommending all the clubs there represented to adopt the code and urge its adoption by all other architectural organizations, so that by concerted action a uniform code would be insisted upon by the profession and acknowledged by the public.

The code is given below that the profession may familiarize themselves with it and consider its adoption by their local organizations :

I—.DEFINITIONS.

1. A competition in design is the process by which, on the basis of merit, from two or more designs proposed, one or more are selected.

2. Competitions may be either "open" or "limited."

3. An "open" competition is one in which any person may a competitor.

4. A "limited" competition is one in which each competitor is especially invited.

5. A competition of either class may be either—

(A) "Premiated"—in which remuneration is provided only for those to whom an award is made.

(B) "Paid"—in which remuneration is provided for each competitor.

6. The promotor is the party who undertakes responsibility for fulfillment of the competition according to its terms, and shall provide for proper and substantial remuneration to each competitor to whom an award is made.

7. The programme is the offer made by the promoter and includes the written or printed statement of the terms of a competition on the basis of which proposals are to be made.

8. A competitor is one who in acceptance of such offer submits a proposal in accord with the terms of the programme

II.—THE PROGRAMME.

9. The programme is an agreement, the terms of which must be carried out in good faith by all parties.

10. The terms of the programme are to be concisely stated and must be mandatory.

11. The programme shall—

(A) Be headed substantially as follows : "Under the general code governing competitions in design of the Architectural League of New York, of which a copy is subjoined.

.....

(Name of promoter.)

invites competitive proposals upon the following programme."

(B) Contain a definite statement as to proposed cost.

(C) Contain a definite provision as to anonymity.

(D) Name the jury, which must include experts upon the subject under consideration.

(E) Fix uniform requirements for drawings, models or other forms of proposals.

(F) Fix a definite time and place for receipt of drawings, models or other forms of proposals.

(G) Fix the nature or amount of the awards or prizes.

(H) Fix the period of time within which decision will be rendered.

III.—DRAWINGS OR MODELS.

12. The requirements for drawings, models or other means adopted for illustrating or describing the proposals must be clearly defined in the programme, including, namely : that they be uniform as to character of rendering, scale, number and size of separate sheets or pieces, and such other detail as may be necessary in the peculiar circumstances of each case.

13. The requirements for drawings, models, etc., must be of the simplest nature, adequate clearly to explain the design, thus reducing to a minimum the labor and materials necessary in their preparation.

IV.—THE JURY.

14. All competitions are adjudicated by the vote of the jury, including disinterested experts. If the subject of the competition be such that its execution requires special expert knowledge, then, if permitted by the programme, the jury may call in additional disinterested experts and also the promoter, to advise with them.

15. The order of procedure of the jury shall be as follows:

(A) Reading the programme.

(B) Passing upon the question of calling in expert adviser or the promoter.

(C) Passing upon the work submitted, with reference to conformance with the conditions of the programme. The jury must exclude from consideration proposals violating the conditions of the programme.

(D) Passing upon the manner of arriving at the verdict.

(E) Deciding upon the verdict.

(F) Writing and signing the verdict.

16. The jury may decide whether the prime object of the competition is to select a design, or whether it is a means of test, having for its object the selection of an artist.

17. The jury must make the awards to the competitors as stipulated in the programme.

18. The drawings, models, etc., are not to be placed on exhibition before the verdict of the jury is rendered, and except when otherwise provided in the programme shall remain the property of their proposers.

19. Voting must be by ballot, but procedure otherwise shall be as agreed upon by the jury.

20. The action of the jury shall be final.

V—.BY-LAWS.

21. Any subscribing society may prescribe such by-laws additional to this general Code of Competition and not in conflict therewith as it may see fit ; but such by-laws are to be included under a separate head, and indicated as being the by-laws of the particular society prescribing them, and the other subscribing societies shall be served with an official copy of such by-laws.

VALUE AND BEAUTY.

IT is not many years since many of us thought that art was a thing in itself, but within recent years we have come to know that art, united with clay, or with another material substance, did much to increase its value. An ugly brick may contain the same amount of material and labor as a beautiful one, or a brick with a good form, yet its value is not commensurate with the amount of material and labor involved in its production. However, if we take the artist's idea of beauty and associate it with the same kind of material and labor which would otherwise go into the crude brick, we find we have greatly enhanced the value of the brick. This fact is of commercial value. Beautiful brick—those of good form—those of decorative quality—do not cost greatly in excess of the crude form. On the other hand, they sell for much more money. The result is a larger profit those who have the business sagacity to take up with the higher idea.

STAIRCASE WINDOW IN RESIDENCE OF MR. J. R. MCRAE, OTTAWA—DESIGNED AND EXECUTED BY H. HORWOOD & SONS, OTTAWA.

Mr. G. B. White is opening a new stone quarry at Amherstburg, Ont.

THE BUILDER

[THIS DEPARTMENT IS DESIGNED TO FURNISH INFORMATION SUITED TO THE REQUIREMENTS OF THE BUILDING TRADES. READERS ARE INVITED TO ASSIST IN MAKING IT AS HELPFUL AS POSSIBLE BY CONTRIBUTING OF THEIR EXPERIENCE, AND BY ASKING FOR PARTICULAR INFORMATION WHICH THEY MAY AT ANY TIME REQUIRE.]

Metal Ceilings.

THE introduction of sheet-metal as a roofing material, and for decorative and other purposes, has made it necessary that the carpenter and builder doing business in small towns and villages should have some knowledge as to the manner of putting in place and securing this material. The imaginary difficulties that present themselves to the uninitiated workman in the application of sheet metal work has in many instances prevented the use of sheet metal, when such would have suited the purpose admirably; therefore, a few remarks as to the manner of "fixing up" an embossed ceiling or wainscot will not be considered inopportune. Let us suppose it is necessary to put up a metal ceiling in a room where no lath or plaster has been applied. The first thing to do is to make a diagram of the ceiling with the exact dimensions marked on each side and end, the exact position of any projections, such as chimney breasts, offsets, or other irregularities, with proper measurements of their projections, width, etc., all of which must be figured on the diagram. Then determine on the style of ceiling, depth and width of cornice, which will, of course, be selected from some one of the many trade catalogues, which may be obtained from any dealer in sheet metal work, whose address can be found in the advertising pages of the CANADIAN ARCHITECT AND BUILDER. All this being satisfactorily arranged, send the diagram and order, with the number or description of the style or pattern of ceiling and cornice required, stating exactly what you want. The dealer will arrange the metal to suit your diagram, and, when received, you can readily find out where to nail up battens on the ceilings and walls to suit the joints of the metal, and to receive the cornice. It must be borne in mind that, for the cornice, there must always be a batten in such a position that the upper member of the cornice can be nailed to it, both along the sides of the room and the ends. This may sometimes require either an extra joist or pieces fitted between the end joists on which to nail the battens. There must also be a batten nailed around the room on the walls to receive the lower edge of the cornice. The line to nail it to will be found by trying a piece of the cornice in situ, after the ceiling strips have been nailed on. If the joists have been properly sized before being put in place, there will be no trouble whatever in putting up the ceiling; but, if they have not, such joists as hang below the others must be dubbed off where the batten crosses them, so that all the strips will be in one plane or have an even face, so that when the metal is nailed in place it will be straight and even. Everything depends on having the ground-work, on which the metal is fastened, true and even on the face, and the battens in the proper positions to receive the edges of the metal. Mitring the cornices at the edges of the room, or about the projections, is a very simple affair, and need not deter the workman from undertaking the job. In the cornice one piece may run through to the wall, and the returning piece cut to butt it, a plan that requires but little skill. The outer angles of projections will require a little more care, but the work presents no difficulties that even an ordinary mechanic may not overcome.

Metal Ceiling Over Plaster.

THE best way to repair old ceilings when the plaster is getting old and rotten and liable to drop down at any moment, is to cover it entirely with a sheet metal ceiling—an operation that is neither difficult nor costly. It is not necessary to take off the old plaster, to remove gas piping or electric wires, but should there be any plaster centre pieces they had better be taken down, as they would remain a source of danger and perhaps an eyesore. If the ceiling has sagged, which is very likely the case in an old building, care must be taken in putting in the grounds or battens to overcome the appearance of "sag," by having some of the grounds much thicker than others in order to have the face of the work level on the under-side. The centre strips will require to be thin, while their ends may want to be thick, and the grounds near the sides of the walls will require to be the thickest. A good way to start work is to nail up a string of the thickest grounds along the sides of the wall, at the proper distance from the angle, to receive the extreme member of the cornice projecting into the room. This strip must be made straight in its face, and should be level. Another strip on the opposite side of the room should now be put in place under the same conditions as the first piece, and it should be kept in line with it, and should not be winding but exactly on the same plane, then by use of a straight-edge, which must be long enough to span the space between the two grounds now in place, the thickness of all other grounds may be determined by measuring up from the edge of the straight-edge to the plastered ceiling. It may be necessary to have several thicknesses on the one strip of ground in order to make up for the unequal sagging of the ceiling. The strips should in all cases be nailed on across the joists, and where the joists run in the direction of the longest dimensions of the room, and the metal is arranged to run in the same direction, more strips will be necessary than would be the case if the joists ran across the room, which they generally do. If the plaster on the ceiling is very rotten, the workman should be as careful as he can in trying to prevent it from breaking down; as the more of the original plaster left on the better will be the work;

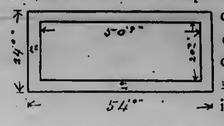
and, as the mortar makes a good non-conductor of sound, it is quite an advantage to the room. When a ground crosses a gas-pipe or an electric wire, it should be notched out or cut in two, leaving a free space for the wire or pipe. There will be other little matters arise, all of which can readily be dealt with by the workman as he meets them. A metal ceiling, while not so nearly artistic as a panelled ceiling in oak, cherry or birch, or as a properly decorated ceiling in plaster, has a beauty of its own, and with the painter's aid may be made quite artistic; and, as it is less costly than any other ceiling having any claim to artistic beauty, and being fire-proof, light and easily applied, it is sure to become quite popular as soon as its good qualities are known, and the prejudices of old-fashioned workmen are removed. Indeed, metal ceilings are already pushing their way into the smaller towns and villages in the country, and bid fair to become as popular as colored glass windows.

Metal Wainscot.

IN preparing for putting up sheet steel wainscot, all the grounds or strips should be brought to a face with a straight-edge and the top ground should be exactly parallel with the line of the floor, and at the proper height to receive the crown moulding or top moulding of the wainscot. This crown mould is generally in a separate piece, and in such lengths as may be required, though this is not always the case, as some manufacturers make the whole panel in one piece, base and top mouldings included. This style is not to be commended, as there are too many butt joints exposed, both on moulding and base, and it requires too much labor at the angles to make the mouldings conform with each other. We are speaking now of putting on wainscot over a plastered wall, in which case it may be found that the wall is not straight by any means, which will necessitate the straightening of it up by means of the grounds, which must be skimmed out in the hollow parts and the plaster removed at points where it bulges out from the wall. The grounds should not be more than ⅝ of an inch thick when possible, in order to encroach into the room as little as may be. This thickness will be found quite sufficient if the strips are well nailed to every stud they cross, and properly "shimmed" wherever required. If the building is of brick or stone, it will be a wise precaution to nail up against the outer walls a thickness of good felt paper in order to prevent condensation on the metal work, no matter whether the walls have been furred or not. This precaution, if well taken, will prevent moisture or sweating on the wainscot. If the building is new, the inner side of the outer wall should be boarded on the studding or furring, and this should, again, be covered with felt, when the metal work may be attached without further preparation, providing, always, the face of the work is straight and true. The wainscot cap, or crown, should be of sufficient projection to receive the lath and plaster above it and show a bold front in the room. Care must be taken in fitting the metal mouldings in the angles and about the doors and windows, and the workman must be provided with a pair of shears or sharp cold chisel and a couple of files, which he will find useful and not difficult to manipulate. The ordinary workman will find nothing very formidable in the putting up of sheet steel ceilings or wainscotings, and it will be more to his interests, and in the interests of good taste, to encourage a more extensive use of sheet metal than it is to discourage it, as is done at the present.

QUESTIONS AND ANSWERS.

"BUILDER," Indian Head, N.W.T., writes: Will you kindly answer the following question: How is mason work measured or how would it be measured, in case of a law suit over a dispute on same. We here in this country measure around the outside of a building, while one authority on mensuration shows it as in the accompanying sketch.



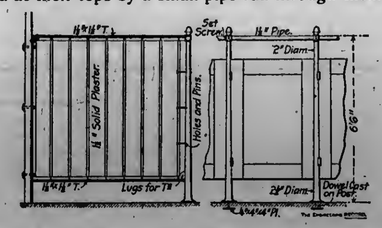
ANSWER.—In measuring stonework in the wall, it is usual in most parts of Ontario to take the whole girt of the outside, bending a tape-line around corners and projections, and multpilying this by the height and thickness of wall, 100 cubic feet of wall measurement making one cord. This method of measurement is allowed for labor alone. If measured for material, the corners are to be deducted, that is to say, a wall 20 feet long, having two side walls entering it, each 2 feet thick, would measure only for material 16 feet long, while the side walls would measure the full length—thus, a building 20 x 40 would measure for material, 112 feet in length, while for labor at so much a cord, it would measure 120 feet. Where a contractor furnishes the stone and lays the wall, he will be entitled to the full measurement of 120 feet. One cord of loose stone of 128 cubic feet will, when laid in the wall, measure about 100 feet. Hence, a mason's cord of stone in the wall is allowed for every 100 cubic feet.

"SUBSCRIBER" asks: Which is considered the better method of putting on shiplap sheeting on studs, diagonal or horizontal?

ANSWER.—It is a disputed point as to whether it is better to nail on sheeting diagonally or horizontally. We are inclined to think that if laid with horizontal joints, tight together, and well nailed to every stud, the work will be as strong and as solid as if put on diagonally, and the economy in material and labor will be quite considerable.

PLASTER PARTITIONS.

Light plaster partitions, 1½ inches thick, have recently been used in toilet and bath rooms planned by Mr. Richard E. Schmidt, of Chicago. The plaster is held by a framework of small steel shapes attached to the wall and to light cast-iron posts. The latter are held at their tops by a small pipe run through them and



fixed with a set screw at every post. The frame reaches to within 10 inches of the floor and is covered with wire lath, not shown in the sketch. Where the frame meets the wall, the plaster is curved out so as to cover the steel shapes and form a good-looking junction

of the two surfaces. The stalls are closed by wooden doors. This type of construction has been used at the Alexian Brothers' hospitals in Chicago and St. Louis. Where the water closets are in groups the partitions have cost $12.50 per closet, including ironwork, plastering and four coats of enamel paint, but exclusive of woodwork and hardware. Partitions of marble with brass fittings for the same places were estimated to cost $36 each.

BUILDING IN VANCOUVER.

VANCOUVER, B.C., March 14th, 1900.

To the Editor of the CANADIAN ARCHITECT AND BUILDER:

DEAR SIR,—It may interest some of your readers to have a few particulars regarding the building situation in this city. As you are no doubt aware, a Builders' Exchange was organized here about a year ago. I understand that at the annual meeting held recently the first board of directors was re-elected. Recently several city contractors have joined the Exchange, and I believe the membership now includes what might be termed a working majority of the city builders, and that it is the intention to make some decisive move in the near future with a view to improving the condition of the trade.

The Exchange made an effort to induce the architects of the city to organize and adopt a uniform contract and code of rules to regulate the practice of tendering for and awarding contracts. A few of the architects met and declared themselves in favor of such a move, but too many of them seemed to consider that independence was of more importance than organization. The Exchange, however, is moving along. A code of practice, setting forth the conditions under which the members will tender for work, has been adopted, and I understand that a committee will shortly complete a form of contract. Many of the builders of this city are anxious that a uniform contract should be adopted, as the existing methods of tendering and letting contracts is very unsatsfactory. In asking for tenders the architects frequently ask for bulk and separate bids; competition is very keen, and the result is that one contractor usually takes the entire work, with little or nothing for the risk and responsibility of the minor trades. Occasionally separate tenders are accepted for the erection of a building, but this method sometimes means trouble and delay, and it suits the architect and his client better to find, if they can, some responsible mason or carpenter who, in order to secure the work in his own line, will assume the responsibilty of the other trades at about the minimum figure for each as obtained by calling for separate trade tenders.

Another practice in vogue here is that of asking for a second tender. The architect estimates the work too low, with the result that even the lowest tender is refused as being above the estimated cost of the building. Then some small changes are made in the drawings and specifications, and three or four of lowest tenderers are asked to revise their figures. A case of this kind occurred recently. Some brick partitions were changed to wood, and some other small changes made. Second tenders were taken from, I think, five contractors. The result was that the man who was the highest tenderer of these five in the first instance was the lowest when the second figures were opened, and he secured the work. Such practice encourages the taking of work at figures that are very risky, not to say unprofitable and unsatisfactory to the parties concerned. At the last meeting of the Exchange a rule was adopted requiring that the prices of all work added or deducted which amounts to 20 per cent. of the lowest tenderer's bid be adjusted with him, and providing for this being done by arbitration in case his figures are not considered equitable.

Competition is veey keen among Vancouver builders. Although there is considerable work in sight, the usual number of bulk bids received is from fourteen to twenty, consequently prices are low. The bricklayers and masons have introduced the eight hour day and have demanded an increase from 50 to 56¼ cents per hour in the rate of wages, to commence on April 1st next. The carpenters ask 33⅓ cents per hour as the minimum rate, but are willing to work nine hours per day excepting on Saturday, when they want a half holiday. Painters are also asking for more money.

A number of contracts were let during the month of February, and some of them are now well under way. An addition will be built to the Hudson Bay stores, Mr. W. T. Dalton being the architect and Mr. C. P. Shindler the contractor; cost $25,000. The Sherdahl block of stores, offices, etc., will cost $19,000 Mr. E. Gunther is architect, and Horrobin & Holdin contractors. Another important corner building is the Lovell block, of which Mr. W. T. Whiteway is architect and A. Milliken the contractor.

yours truly,

"CARPENTER."

AMENDMENTS TO PLUMBING BY-LAW.

The Master Plumbers' Association of Montreal, acting in conjunction with the Health Committee of the Council, have prepared important amendments to the plumbing by-law of that city, looking to the appointment of a board of plumbing examiners. The proposed changes, which will be submitted to the city council some time next month, are as follows:

TO THE ALDERMEN OF CITY COUNCIL OF MONTREAL:

DEAR SIR,—We, the master plumbers of the city of Montreal, take this opportunity to make known our views, hoping by doing so to be able to persuade our aldermen to amend our by-law No. 215 concerning plumbing, drainage, and ventilation of buildings, as we would like to keep pace with the principal cities of America in the advancement of sanitary science, and we do hereby urgently request that the members of the city council take steps to place us in an equal position with other cities of our standing, viz:—by appointing a board of plumbing examiners to deal with all matters appertaining to plumbing, drainage, and ventilation of buildings.

1. The board of plumbing examiners is hereby constituted, to consist of one city sanitary engineer, one medical doctor, and three master plumbers. The last three mentioned shall hold office for one year after their appointment and shall be paid a fee of .... dollars for each session of the board, and this board shall be called together by the city sanitary engineer (who shall be the chairman of the board), and at such times as he may find it necessary.

2. It shall be the duty of the above mentioned board of plumbing examiners to examine master plumbers and journeymen plumbers and grant licenses and certificates to the successful applicants, and to enquire into all charges and disputes arising from the operation or interpretion of any part of this by-law concerning plumbing, drainage, and ventilation of buildings, and to hear and decide disputes arising between the plumbing inspector and the public and said inspector and the master plumbers, and their decision shall be final and conclusive; and it shall be the duty of the chairman of the board to take such necessary action within one week from proper notice to him, in writing, against any person accused.

3. In case of dispute arising relating to any provision of the above mentioned by-law, the party who disputes shall give notice to the sanitary engineer in writing, setting forth the nature of the dispute, and they shall appear before the board of examiners, who shall hear and decide on the merits of the said dispute, and the decision of the said board shall be final and conclusive.

4. The council shall from time to time, as occasion may require, on the recommendation of the board, appoint such inspectors as may be required or found necessary, but no person shall be eligible for such appointment who shall not have passed a satisfactory examination for proficiency in both practice and theory of plumbing and drainage before the board, and such inspector or inspectors shall have full power to act on all matters under this by-law subject only to the board of examiners, and such inspectors shall be under the supervision of the board of health and shall be attached to the office of the sanitary engineer, and shall be paid such salary as the council may determine.

5. Whereas it is desirable and necessary to license and regulate master plumbers in the city of Montreal, therefore we wish the council of the corporation of the city of Montreal to enact as follows: Upon and immediately after passing of this by-law and in every ensuing year before the first of June, any person desiring to carry on the business or trade of plumbing within the city of Montreal, shall take out a license, for which license such person shall pay at the time of issuing thereof the sum of twenty-five dollars ($25.00) except as hereafter mentioned, and no person shall receive such a license unless he is of the full age of twenty-one years, and in no case shall a license be granted in any person unless he carries on the business or trade of plumbing and has a place of business for such.

6. That he is himself a practical plumber and that he will not permit or allow any plumbing work to be done by or for himself in connection with his business except by competent workmen having passed their examination before the board of plumbing examiners, and that he will not violate any of the terms, conditions, rules or regulations contained in this by-law No. 215 respecting plumbing, drainage and sanitary matters.

7. That every person desiring such license shall file with the board a petition in writing giving the name of the applicant, and in case of a partnership the name of each member therein, together with the place of business, and asking to become a licensed plumber.

8. Any change in the firm or location of the business shall be properly reported to the board, and that the license shall be at all times in a conspicuous place at the place of business, and no license shall be transferrable.

9. All master plumbers shall be held responsible for all work done by their employees in connection with the business for which this license is issued, and upon satisfactory evidence furnished to the board that any master plumber has been twice convicted for the violation of this by-law or any part of this by-law respecting plumbing, drainage and sanitary matters, that the said board of plumbing examiners declare the said license forfeited.

10. Any master plumber whose license shall be declared forfeited as herein before mentioned, shall not again be entitled to a license until the said declaration of forfeiture shall be revoked by the board of plumbing examiners.

11. No person shall do plumbing or carry on the business of plumbing unless he is the holder of a license issued as hereinbefore mentioned to himself or to the partnership of which he is a member.

12. All persons working as journeymen plumbers shall pass a satisfactory examination before the board of plumbing examiners, and receive a certificate within three calendar months after this becomes law, and no master plumber shall employ plumbers or any person to do plumbing work who shall not have passed a satisfactory examination before the board of plumbing examiners, and no journeyman plumber shall carry on the business or trade of plumbing on his own behalf before he first obtains a license as a master plumber.

All master plumbers carrying on the business of plumbing in the city of Montreal at the time of this becoming law shall be granted a license on applying and paying for the same within three (3) calendar months of this becoming law, but all applicants in the future shall pass a satisfactory examination before the board of plumbing examiners befure a license shall be granted.

Signed on behalf of the Master Plumbers' Association of Montreal.

LEGAL.

REG. V. TORONTO PUBLIC SCHOOL BOARD.—Judgment by the Divisional Court at Toronto on motion by defendants to quash a conviction of defendants, who were charged with an infringement of by-law No. 2,478 (particularly sec. 13), by permitting closets to be fitted up under the Smead-Dowd system and used in a building contrary to the by-law. The Police Magistrate for the city of Toronto, though the case seemed clearly within the by-law, refused to convict on the ground that the municipality had in this case sanctioned the violation of the by-law. The defendants were, however, on appeal to sessions, convicted, and, having obtained an order nisi then, made this motion. Held, that the information and complaint in this case being for an offence against a by-law of the City of Toronto, passed under the authority of the municipal act, R.S.O., ch. 223, sec. 551, the criminal code, part 8, sec. 840, does not apply; so that the authority, if any, for an appeal to General Sessions from an order of dismissal, must be found in the Ontario summary convictions act, R.S.O., ch. 90, and "conviction or order," in sec. 7 of that act means one of or against the party against whom the information and complaint is laid. Order as there used does not mean order of dismissal. It is for the Legislature to so construe the word if they desire. The words of sec. 105 of the imperial act 5 and 6 Will. IV., ch. 50, are much stronger in favor of an appeal from an order of dismissal than sec. 7 of the Ontario act, yet in Reg. v. Keepers, etc., of London, 25 Q.B.D., 357, the court held that they did not include an order of dismissal. Conviction quashed without cost.

MURPHY V. HUTCHINS.—This was an appeal to the Court of Review at Montreal, from the Circuit Court for $19.60, and rested on the interpretation to be placed on 59 Vic., Cap. 42, otherwise known as the Auge Workmen's Lien Act, which creates a privilege upon immovables for the claims of workmen, the suppliers of materials and others who contribute to the construction of buildings. Defendant gave a contract to one Wand for the erection of a house on the property of the former. Plaintiff, with other workmen, whose claims are now in abeyance until the present issue is finally determined, were engaged by the contractor to work upon the building. The judgment complained of by defendant condemned him to deliver up his property to be sold in due course of law unless he paid the wages due plaintiff by Wand within fifteen days. These wokrmen were in the habit of receiving their wages on the Saturday of each fortnight. The last payment was made on the 17th of September, 1898. On the 26th want of material caused a stoppage of the work. Wand failed to pay his workmen either then or on the 1st of October. On the 7th fifteen of them, including plaintiff, verbally demanded their overdue wages from defendant, who refused to pay on the ground that he owed his contractor nothing. On the 10th a written notice was served upon him setting forth the number of hours worked, the rate per hour, and the resulting amount due to each of them. This notice, if followed by registration, would have constituted a mortgage on the property in favour of each of the parties signing it. It was agreed, however, among all the parties concerned that registration of this document should be waived, without any right being thereby prejudiced. The assertion of defendant that he owed nothing to the contractor at the sale of either notice is not controverted. He declared his readiness to personally assume responsibility for their future wages and to hold any surplus which might thereafter become payable to the contractor for the extinguishment of overdue wages. The offer was not accepted, and he, in turn, refused to pay again what he had already paid to the contractor. Mr. Justice Davidson reviewed the law on the subject, and came to the following conclusions: "Thus, while the previous law required unpaid workmen to give notice to the proprietor for each term of payment due them, the amendment required it to be given at and for each term of payment due them. It was the evident intention of the Legislature to impose the condition that the proprietor should be instantly warned of the default of his contractor. This is a very rigorous law. It imposes upon one person the duty of looking after the debts of another, under pain of finding his property burdened with a number of mortgages, and must, in regard to the formalities and notices required, be strictly construed. Building operations are unquestionably hampered by its provisions; care must be taken that they are not made impossible. At the very latest, the wages of the complaining workmen were due on the 1st of October, and notice of the contractor's default might easily and ought to have been given to the proprietor on the 2nd; whereas it only reached the proprietor, and even then, informally, on the 7th. All manner of difficulties and disputes might arise between the proprietor and contractor if a delay of this kind were to receive judicial recognition. If there may be seven days, why not fourteen? And in the interval, is the proprietor to be upheld in refusing to pay his contractor or architect's certificates, on the plea that he stands exposed to mortgages which may still be registered against him? Uncertainty of this kind might, on the one hand, expose the one to a suit of law, and the other to possible ruin, and prejudice the interest of the workmen themselves. We, therefore, reverse the judgment under review and dismiss plaintiffs action with costs, Lavergne, J., dissenting."

EFFECT OF SEA WATER ON MORTARS.

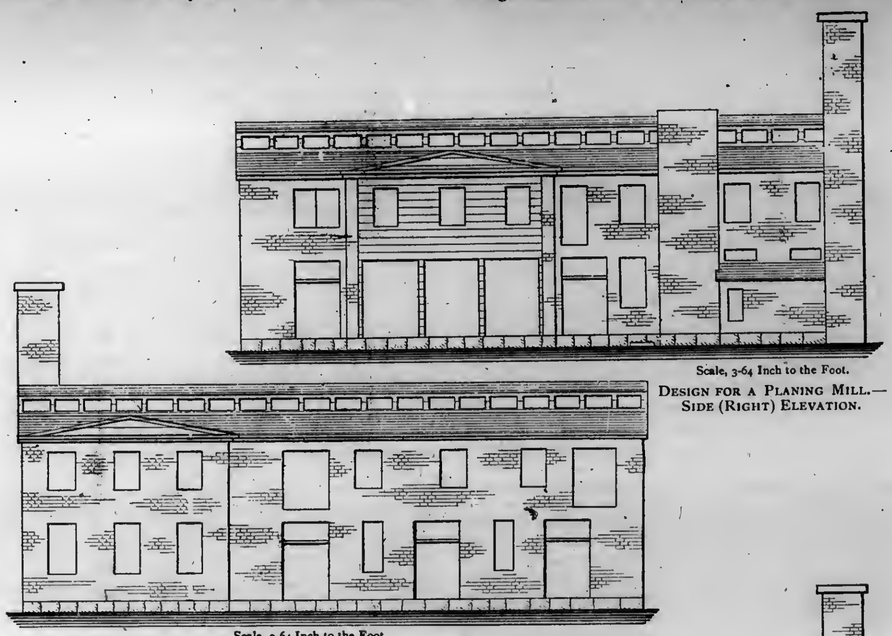
SOME interesting observations relative to the action of sea water on mortars are contributed by E. Caudlot, whose investigations in the harbor of La Rochelle cover a period of something like 40 years. Blocks of 60 cm. (2.36 inches) in length were exposed to the open sea from 1856 to 1875, and were above the water surface at low tide. The mortars were of hydraulic limes of different origin, of natural cements from Pouilly, Vassy, &c.; of artificial pozzuolanas mixed with lime and sand; of trass from Andernach, &c. Nearly all blocks had completely lost their cohesion after different periods. The few blocks of Portland cement experimented upon were in good condition; but blocks of neat cement (English and French) were decomposed. From these tests Vienot draws the following conclusions: 1. Neat cements are destroyed more rapidly than mortars of a certain composition; 2, mortars made of one volume of cement to one of sand, and, again, of one volume of cement to two of sand, are those which offer the greatest resistance to sea water. They will last for 20, 36 and 38 years.

Thurninger commenced new tests with blocks of masonry, and concrete made of lime and Speil mortar, with a length of edge of 40 cm. (about 1.6 inches). In 1895 the masonry blocks disappeared, their destruction having commenced four years after their exposure; and out of 32 concrete blocks only 26 remained, but they were in advancing decomposition. In 1880 other tests were commenced on blocks submerged, of various limes. Many of these have perished. "Out of 31 masonry blocks laid in Portland cement mortar, and submerged between 1881 and 1892, 23 are still intact, while some have commenced to disintegrate." Vienot points to the following conclusions: 1, Mortars of hydraulic lime, mixed in any proportion, in most cases commence to disintegrate after one or two years' immersion in sea water—they crumble into puip after periods varying in length, but apparently not exceeding 15 years; 2, concrete resists better than masonry, owing to the greater density imparted to it by ramming; 3, rapid setting cements may commence to disintegrate after six or eight years, but may last longer than 38 years without crumbling; 4, the mortars offering the greatest resistance are those consisting of one part cement to one or two parts sand. This mixture corresponds to the weight of cement required to fill the spaces between the grains of sand. These, therefore, are the least porous mortars.

DESIGN FOR A PLANING MILL.

A CORRESPONDENT of Carpentry and Building sends the accompanying drawings of a planing mill, concerning which he says :

As being of interest to the correspondent in question, and possibly to other readers of the paper, I send floor plans and elevations of a millthat I prepared about three years ago for a person who contemplated erecting a new mill near Philadelphia. In the present instance it will be seen that I have tried to arrange the machinery in the mill in such a way as to be most convenient.

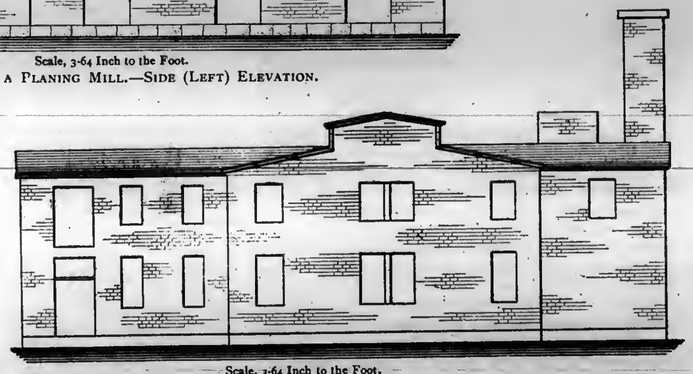


Scale, 3-64 Inch to the Foot.

DESIGN FOR A PLANING MILL.—SIDE (RIGHT) ELEVATION.

Scale, 3-64 Inch to the Foot.

DESIGN FOR A PLANING MILL.—SIDE (LEFT) ELEVATION.



Scale, 3-64 Inch to the Foot.

DESIGN FOR A PLANING MILL.—FRONT ELEVATION.

Referring to the floor plans, it will be seen that the machines are numbered, as they can be more readily indicated in this manner, and by less confusion than by writing the name of each one on the drawing.

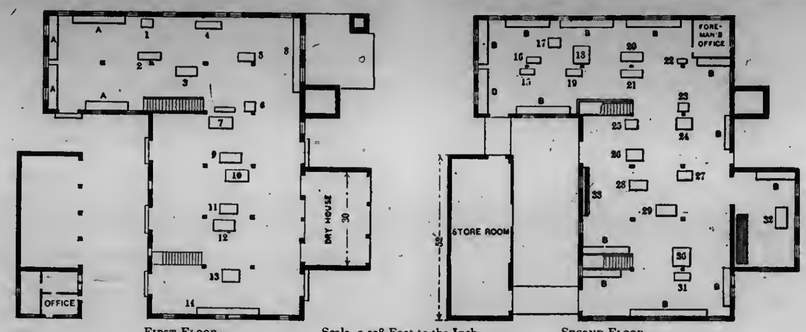
In connection with the first floor plan, A A, etc., are work benches. No. 1 is a pulley stile mortiser, No. 2 a jointer with 14-inch cutter, No. 3 a Universal saw bench, No. 4 a molding machine with 6-inch cutter, No. 5 a rip saw, No. 6 a heavy band saw, No. 7 a molding machine with 10-inch cutter, No. 8 a swing cut-off saw, No. 9 a large rip saw, No. 10 a double surface planer, No. 11 a rip saw, No. 12 a molding machine with 7-inch cutter, No. 13 a rip saw and No. 14 a swing cut-off saw.

On the second floor, B B, etc., are work benches. No. 15 is a light mortise machine, No. 15 a rip saw, No. 17 a sash and shutter clamp, No. 18 a tenoning machine, No. 19 a horizontal boring machine, No. 20 a sand papering machine, No. 21 a molding machine, No. 22 a blind slat tenoning machine, No. 23 a jig saw, No. 24 a light band saw, No. 25 a cylinder sand papering machine, No. 26 a single surface planer, No. 27 a boring machine, No. 28 a jointer with 16-inch cutter, No. 29 a Universal saw bench, No. 30 a tenoning machine, No. 31 a mortising machine, No. 32 a door clamp and No. 33 a turning lathe.

The engine, it will be noticed, is placed in the basement in order to get it as near as possible to the center of its work. There is also a machine shop in the basement, as it is supposed that the engineer will have time to repair the machines, make bits and sharpen the knives. He has all his work in the basement, and is able to watch his engine at the same time. The floor of the boiler room is level with the floor of the basement, so as to make it convenient to the engine. It will be noticed that there is a dry-kiln on one side of the main building opening into the main floor at one end, while the other end opens to the railroad track at the side. The room is laid with pipe on the floor, and heated by the exhaust steam from the engine. The room over the dry kiln, opening on the second floor, is used for glueing purposes, and is fitted with glue pans and pots. There is a coil pipe for heating veneers, also a veneer press and a large door clamp.

The building is arranged for the frame makers to work on the first floor in the "L" of the building, and for the heavy machine work, such as cutting out, planing and working moldings, to be done in the main part part of the building. On the second floor of the "L" are made the sash, outside blinds and shutters, and here also are the inside blind makers, the work of the different divisions extending into the main building. The balance of the space on the second floor is intended to be occupied by door makers, stair workers, bulks, etc. An inspection of the second floor plan shows that there is an office for the foremen and his draftsmen, which is to be enclosed by sash, so that observation can be made of what is going on in the mill. At the left of the main building are the offices and warerooms, which are built two stories high to correspond with the other structures.

To run a mill of this size to its full capacity would require a bookkeeper, a man to estimate, one to make out orders and make measurements, a main foreman and his assistant, an engineer, a teamster, and 35 mechanics, both bench and machine hands. I trust that what I have given may be of some benefit to the readers of the paper, and I would be glad to hear from any of them on this topic through the columns of the paper.

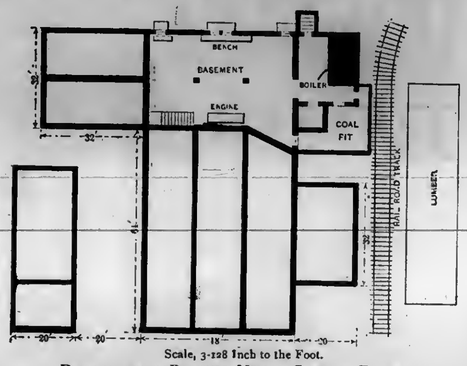


FIRST FLOOR. Scale, 3-128 Foot to the Inch. SECOND FLOOR.

DESIGN FOR A PLANING MILL.

COLLECTION OF BUILDERS' ACCOUNTS.

A MASSACHUSETTS builder has applied a novel remedy for the collection of debts due him. Not long ago a contractor agreed to build a wooden house on a lot in the village of Norfolk Downs. When the house was ready for plastering he applied to the owner for a payment on account. Receiving no satisfactory answer, he concluded to put a lien on the estate for his work and materials, but discovered that the property had been heavily mortgaged, and that his lien would probably bring him no return. Under these circumstances, acting, it is said, on the advice of counsel, he took a rather heroic resolution, and making his appearance on the ground one evening, with a building mover and sixty men carrying suitable implements, he had the house lifted from its foundations and rolled away to another lot in the neighborhood. When the other party to the contract arrived on the scene, he was, to say the least, displeased, and proceeded to enter complaint against the builder for larceny of the house, under a provision of the statutes, which applies to the purloining of real estate the same penalties as those which attach to the stealing of personal property. The contractor and the building mover have been notified to appear for trial, and the case promises to be an interesting one. Obviously, the important point involved is whether the house, which, although technically attached to the real estate, has been paid for by the contractor, was the property of the owner of the lot in such a sense as would make it larceny to carry it away; and a good deal of argument can be expended on this question.



Scale, 3-128 Inch to the Foot.

DESIGN FOR A PLANING MILL.—GROUND FLOOR.

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AGENTS FOR CANADA

MANUFACTURES AND MATERIALS

NEW SOLAR PRISM GLASS.

We have been shown a sample of a new prism or reflecting glass, manufactured and patented by the Solar Prism Co., of Cleveland. The manufacturers claim it to be better than any other now in use. It is quite natural to suppose that, considering the demand for such glass, some one would improve on the glass now in use. Thay claim it to be the best, and principally on account of the projections or prisms being a quarter of a circle, the curve having better reflecting qualities than a straight line. There is also a cone in the center of each square which is a great light producer and adds very much to the appearance, as it relieves the monotonous squares. The Solar Prism Company are also making this glass in geometrical forms of various designs. The N. T. Lyon Glass Co., Limited, of Toronto, are the agents for Canada.

NOTES.

The British America Paint Company, recently organized, has purchased the Victoria and Vancouver factories of the Canada Paint Company.

Incorporation has been granted to the Dominion Fence Company, capital $750,000, and head office in Toronto. The company will manufacture and trade in iron and wire fences, metallic roofing, and siding.

The McClary Manufacturing Co., of London, Ont., have elected officers as follows: John McClary, president; W. M. Gartshore, vice-president and manager; George McClary, treasurer; J. K. H. Hope, secretary.

The Thomas Robertson Company, of Montreal, are placing on the Ontario market their "Sirdar" hot water boiler, and have appointed Mr. George Craig, 88 Bay street, as their Toronto agent. This boiler has been selling for some time throughout the eastern provinces, where it has been given a very favorable reception.

Mr. T. C. Larney has formed a syndicate to develop the marble deposits in the vicinity of Shoal Bay, near Vancouver, B. C. It is said that the marble of this deposit is superior to any yet found in British Columbia, and that it will prove a great acquisition to the beauty of the buildings of the coast cities. The syndicate have opened an office in the Fairfield block, Vancouver.

We have received samples of "Chin-Chin" and "Pelican" waterproof drawing inks manufactured by Mr. Harry Steuber, of London, England, whose announcement will be found in our advertising pages. These inks are recognized as of excellent quality, and are used and endorsed by architects and by leading schools and colleges everywhere. The Art Metropole, Toronto, is the Canadian headquarters for these inks.

Messrs. John McConnell and Charles E. Levey, late of the Consolidated Plate Glass Company, have recently formed the Canada Plate & Window Glass Company, and have opened an office and showrooms at 9 Richmond street east, Toronto. They will carry in stock a complete line of mantels, fire-places, grates, tiles, and mosaics, as well as plate and window glass and ornamental leaded work. Mr. McConnell is manager and Mr. Levey secretary of the company.

An Ontario charter has been granted to the Grey and Bruce Portland Cement Co., of Shallow Lake, Limited, with a capital of $199,000. The company has secured options on five hundred acres at Shallow Lake, opposite the works of the Owen Sound Portland Cement Company. Three hundred acres of the property are said to contain deposits of the finest clay and marl necessary for the manufacture of cement, and it is proposed to erect works with an output of five hundred barrels of cement per day. The head office of the company is to be in Owen Sound, and the directors are: James McLaughlan, Owen Sound; John George, Port Perry; J. R. Spence, Wiarton; Joseph Young, Park Head; and J. E. Campbell, Hepworth.

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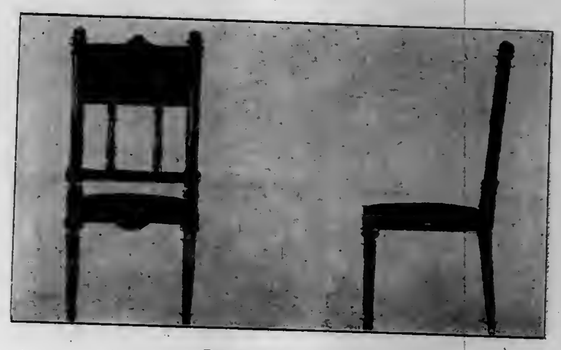

DINING SALOON CHAIR.

TRIPLE SEAT LOUNGE, MAIN SALOON.

DOUBLE SEAT LOUNGE, MAIN SALOON.

SOME OF THE FURNITURE ON THE RICHELIEU & ONTARIO NAVIGATION COMPANY'S STEAMER "TORONTO."

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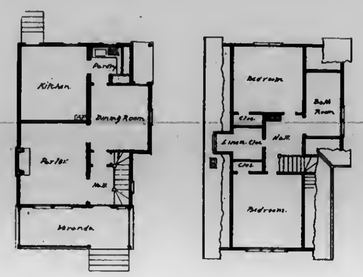

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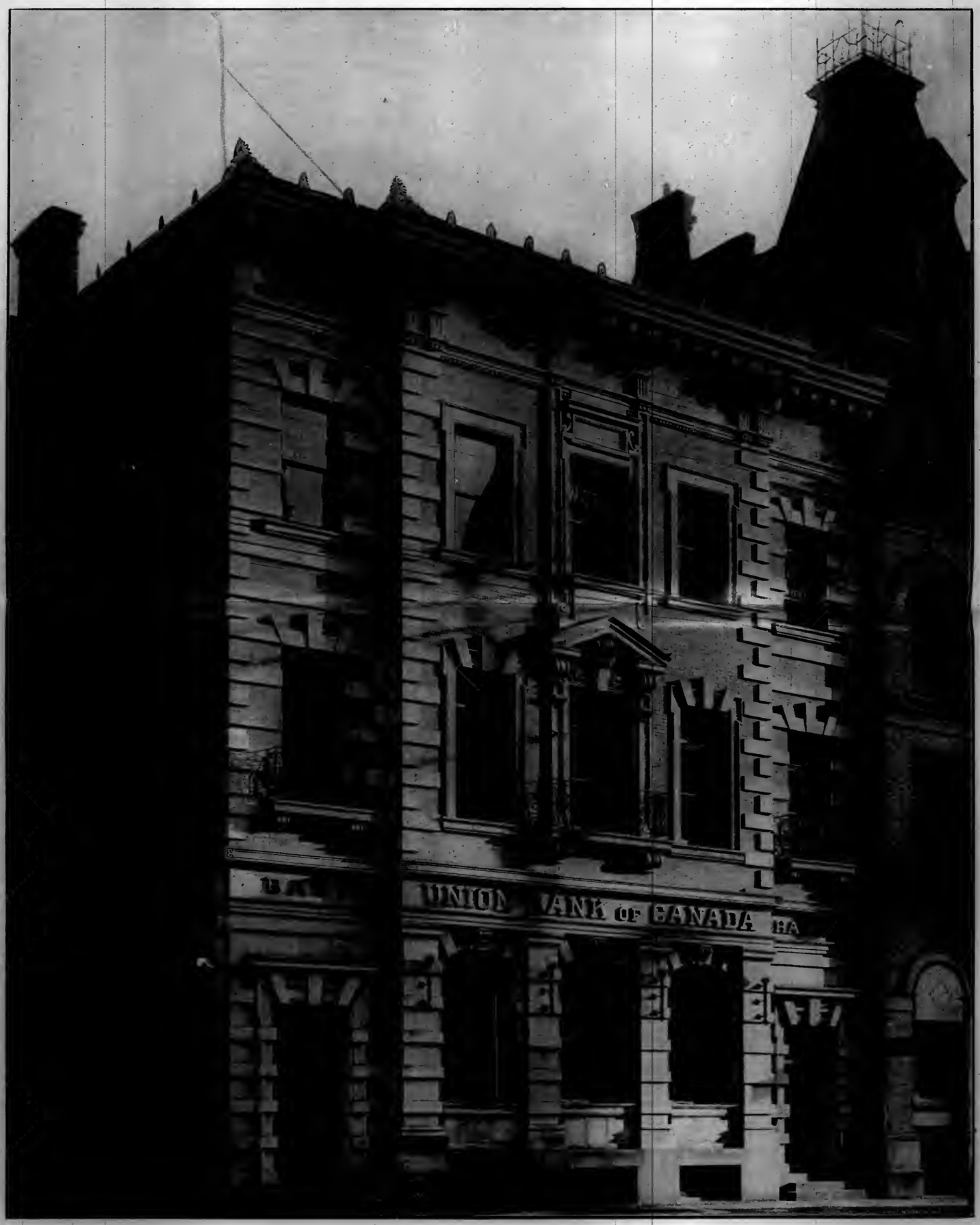

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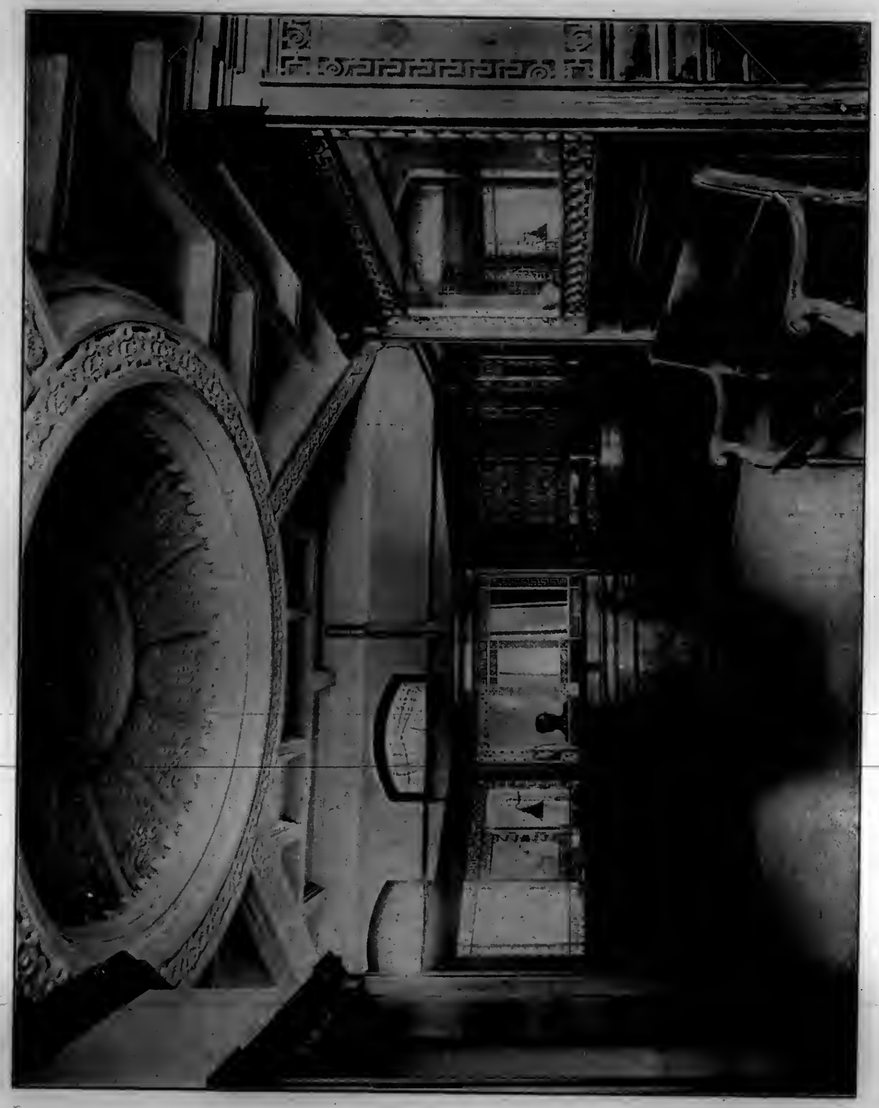

INTERIOR OF BANKING ROOM, UNION BANK BUILDING, TORONTO.
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CANADIAN ARCHITECT AND BUILDER.

VOL. XIII.—No 5. MAY, 1900 { PRICE 20 CENTS. $2.00 PER YEAR.

—THE—

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The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to foreign subscribers is $2.50. Subscriptions are payable in advance. The Journal will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrears of subscription paid.

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REMOVAL NOTICE.

On May 1st, 1900, the Montreal office of this publication was removed to larger quarters in the Imperial Building, 107 St. James street. Customers will always find the office open during business hours, and visitors in Montreal are extended a cordial invitation to call at the office, where they will be given every possible assistance and furnished with requisites for answering correspondence. The telephone number is Main 2299.

Ontario Society of Artists' Applied Art Exhibition.

THE promoters of this exhibition have done well to carry it out in spite of lack of encouragement from manufacturers and craftsmen who should have been the most interested in making a good exhibition of this kind. It may be that non-exhibitors know their own business. There is no Arts and Crafts Society—no recognized movement—at the back of this exhibition, as there has been at the back of the English exhibitions, of which this is an obvious imitation; and it may be that some manufacturers see no particular gain in helping to create such a movement if lack of help will leave things as they are. But this sort of holding back is always a mistake. Public taste is moving, and it seems to be moving in a wholesome direction. Whether by imitation of England or infection from the same source, there is a new taste arising, if indeed it has not arisen, which will no doubt be more easily defined in a quarter of a century hence than at the present time when it is in process of development, but which seems to have as its basis a new appreciation of the natural quality of material. A somewhat crude manner of design is the result in English work, with little moulding and an elementary form of ornament, something like a snaky water weed, which appears in every material—wood

and stone carving, silversmiths' and other metal work, leaded glass, leather, wall paper, wall hangings, and painted decorations—in all alike appears this rudimentary vermiform weed. Something of the same kind is the characteristic form appearing in the carving of all primitive peoples, and it has made its appearance again, we can only suppose, according to a natural law of the human mind, in this nascent work of the young English school, indicating how far they have gone back to the beginning of art in shaking off the degeneracy of its late developments. We may assume that it indicates also that there is a great deal of development yet to come to the English work before it (still in obedience to law) degenerates. In the meantime, some of the exhibitors in the Ontario Society's exhibition have thought fit to adopt the peculiarities of the English Arts and Crafts Society's work with the same seriousness with which they would set up an Order. But there are many good things in the exhibition; enough to show that we have designers and that the exhibition has been worth while to hold. If there is to be another in prospect at some fixed time in the future—say a year hence—this example will cause the future exhibition to be borne in mind during the year, and we may expect good results.

Fire Tests with Partitions.

THE British Fire Prevention Committee have recently published an account of two fire tests which are of general interest as giving some reliable evidence as to the fire resisting quality of partitions, both economical and occupying but little space. The partitions tested were an ordinary stud partition packed with what they call "silicate cotton" or "slag wool (evidently the same thing as our "mineral wool"), and a partition of wire lathing plastered three coats on each side, the whole resulting thickness being but 2½ inches. The testing chamber in each case was the same, a brick hut measuring 10 feet by 10 feet with a 7 foot 10 inch ceiling. There was a doorway at one end of the hut and the partitions were built about two feet in from this, so as to leave a passage in which the observers could stand to watch the effect of the fire upon this side of the partition. The fire was applied on the other side, which was closed except for draft holes and holes through which observation could be made and the water introduced to play for a couple of minutes upon the heated material as the final condition of the test. The fuel used was gas, and the supply was regulated by valves and dampers. There were instruments for recording the temperature at different points both within the fire chamber and on the protected side of the partitions. Both partitions were made thoroughly tight at walls, floor and ceiling with precautions unnecessary to mention, as forming part of that particular situation only. The plaster partition was laid on wire lathing of ¾-in. mesh, 19 gauge galvanized iron wire protected at the junction of the vertical and horizontal wires by ¼-in. terra cotta connections burnt on to the junctions. On this was plastered three coats, the first consisting of 1 lime to 4 sand, and four pounds of hair to each cubic yard, and also of lime and "burnt ballast," in the proportion of 1 lime to 2 burnt ballast. These materials were incorporated in equal proportions, and plaster of Paris was added in the proportion of 1 part to 3 of the incorporated stuff. The second coat was of the same materials. The third consisted of 2 lime to 1 plaster of Paris. In 4 minutes after the heat was turned on there were hair cracks on the passage side of the partition, which increased by degrees, and after a time steam came through the cracks. The partition itself became too hot to bear the hand, the heat beginning at the top and extending gradually downwards; but until the time the test closed—25 minutes—it was never possible to ignite a vesta by contact with the surface. The thermometer in the passage rose from 38.5° Fahr. to 100°. The water turned on for two minutes on the inside of the partition at a pressure of 20 lbs. washed off some of the two upper coats of plaster, at the point where it struck. The maximum heat was 2,000° Fahr. The wooden partition was built of 2 x 4 in. "yellow scantling," 14½ in. on centres, covered with galvanized iron wire netting fastened to the studs with galvanized iron staples. The space between the studs was then packed tight with "slag wool" and the partition covered with ¾ inch tongued and grooved sheathing. The test lasted 45 minutes, the maximum heat was 1800 degrees Fah'r. Within 5 minutes after heat was turned on the inside sheathing was all on fire. It soon fell off and the studs flamed freely. After a time the slag wool appeared to be incandescent all over. The effect, as seen after the fire was turned off, was that the wire netting was sound and good, the studs burnt, but not far enough in to set the staples free, the slag wool was fused all over the inner face about ¼ inch deep and blackened next to the studs for about an inch inwards. The surface of the slag wool was slightly pitted by the action of the water. The slag wool behind the fused face was as good as when put in. The whole of the boarding on the passage side of the partition was clean, white and sound. There was no effect perceivable in the passage except that immediately before the heat was turned off the two top boards of the sheathing were just warm to the touch in the centre. The thermometer in the passage which stood at 54 degrees Fahr. when the test began was still 54 degrees half an hour afterwards. The thermometer hung against the boards of the partition midway up.

Decorating Toronto City Hall.

A COMMITTEE of the Toronto Guild of Civic Art waited upon the Property Committee of the Toronto City Council last week to present a memorial proposing that, if the City Council would provide $1,000 a year for a few years, the Guild would undertake to oversee the decoration of the walls of the entrance hall on the ground floor, at the rate of a couple of panels a year, according to a scheme of subject matter set forth in the memorial. It was proposed that the theme of the Pioneers, begun in the six panels presented by Mr. Reid last year, should be continued in the fourteen other panels that remain. Subjects suggested are: Early Cultivation, Clearing the Land, Felling the Forest, Building a Log Cabin, Treaty with Indians, Hunters' Camp, Long Portage (extending over three panels), Early Missionaries. The arguments are obvious, both that the work of decorating should be continued and that the oversight and change should be committed to a body of cultivated and public spirited men like the Guild of Civic Art. The finished appearance and agreeable tone of the hall at the point where Mr. Reid's decorations are in place is in marked contrast to the crudeness of the remaining portion which is not decorated. Decoration of some kind is needed that the hall itself may have justice done to it. But subject decoration by means of oil painting is more than wall colouring. If these paintings have the ordinary success that scale, position and subject matter should give, the decoration of the city hall would be a rival to the building itself; for it is remarkable how, after visiting foreign cities, the recollection of great buildings fades from the mind, while the impression of wall paintings within them remains fresh, and to most visitors the wall paintings are the greatest attraction. If the city hall is intended to form one of the attractions of Toronto, there is no better way of making that end sure than by spending another $7,000 or so in mural paintings for the entrance hall. The deputation of the Guild was met with sympathy, respect and even admiration, but on the money question all was dark. Indeed, while waiting to be heard, the deputation had the privilege of listening to a discussion by the Property Committee as to whether some alterations required to make one of the civic departments comfortable could be executed, and heard the conclusion that it was of no use either ordering the work or referring it to the sub-committee, because the appropriation for the building has, as was clearly and definitely stated, "come absolutely to an end and there is no more of it." After this the ill-omened politeness with which the Mayor received the deputation, and his unqualified regret that there was no money for the purpose they proposed, were to be expected. But this does not alter the fact that a thousand a year spent on the city hall in this way for a few years would be an incalcuable addition to the two millions already spent, perfecting the building so as to give it value outside of its ordinary uses, as one of the attractions of Toronto. It would perhaps be possible, as was suggested afterwards by an alderman, to obtain, by private contribution, money for the decoration of the city hall, but the work is after all a municipal work, and it does not seem proper that persons who are essentially private persons, groaning under taxation like the rest, should be asked to subscribe to this work, only because they have a taste for art. To interest in the project a wealthy man, whose residence in Toronto has proved so profitable that he feels inclined to return thanks by a handsome gift to the city, would be another thing.

Code or Rules for Tendering.

IN another department of this number will be found a code of rules for tendering, recently adopted by the Vancouver Builders' Exchange. The state of affairs that has led to the foundation of this code is no doubt distressing, but, if the cause at the bottom is looked for, it will be found to be the keenness of competition among the builders themselves. This condition, however hard, is unfortunately normal. What has to be guarded against is the degeneration of competition into unfair competition, and it is obvious that the surest way to prevent this, to safeguard the interests of the competitors themselves, is not to surround the tendering with conditions of mystery and suspicion, but to have the tendering conducted as openly and as much above board as possible. The conditions which stipulate for clear drawings and specifications, so that there can be no mistake about their meaning, are excellent. It is also a fair and business like contention that in bulk tendering a commission should be allowed on the sub-contracts, and there is no reason why bulk and separate tendering should not be made in this way. It is an architect's duty to find the lowest price at which he can get good work done, but no architect in respectable practice wants to be involved or to involve his client in cut rates or scamping prices; and if he knows that the recognized building practice is to make bulk tenders for a commission, he—speaking still of the ordinarily respectable architect—is not drawn to the contractor who offers to go behind the practice of his exchange in this respect. But when it comes to involving the architect in the suspicion which is properly due to shifty competitors in the building trades, concealing from him the details of the price, endeavouring to make him open tenders in public, this is to force him out of the middle position he should occupy, seeing fair play for both parties to the contract, and make him take side with the owner only, leaving the builder, as he will have it so, to look after his own interests himself. The more the architect knows about the prices the better. If he is left to imagine, in consequence of elaborate precautions for secrecy, that the margin for profit is unreasonable, he thinks it his duty to deal with the man who appears to be willing to bring this down to a reasonable limit. If he knew that the price offered him meant failure or scamped work, he would be as much against it as the competing contractors. A bill of quantities and schedule of prices submitted with each tender, to be opened when the tender is accepted, would be the most satisfactory basis for considering the price and would do away with all difficulty and suspicion in adjusting changes. A fair price for good work is for the interest of every one. The more definitely this price can be fixed and known the better for every one; it is only as the readiest means of arriving at it that competitions have been established, and the more mystery is made to surround it the keener will be competition, the more chance there is for unfair competition, and the less chance for the ultimate attainment of the really fair price. Publicity is the preventive of underhand dealing; it acts as a check on all parties. As far as the architect is concerned, if there is reason to doubt of good faith of an architect, if he cannot be trusted to open tenders, to deal fairly in a matter of bulk and separate tendering, to make a proper use of a bill of quantities and prices, the obvious course is to decline to tender in his office. The sooner he is brought to understand that he must stop his practices or his practice the better.

ILLUSTRATIONS.

DESIGN FOR A BUNGALOW.—R. M. FRIPP, F.R.I.B.A., VANCOUVER, ARCHITECT.

SPECIMENS OF MAORI ART, ILLUSTRATING MR. R. M. FRIPP'S ARTICLE, IN THIS NUMBER.

BAPTIST CHAPEL, SOUTH LONDON, ONT.—BURKE & HORWOOD, ARCHITECTS.

The site and position of the lot and the finances of the congregation made it necessary to adopt a basement school room. It was also an instruction of the committee that the entrance should be roomy and attractive, and that it should light up well at night, as the sides of the building would not be seen to any extent. The large porch permits of broad easy stairs to the auditorium and easy and direct entrance to basement.

Mr. R. L. Macdonald has assumed the management of the brick and terra cotta works at Pugwash, N.S.

It is rumored that Mr. George Campbell has secured, for a syndicate, options on all the granite properties in the vicinity of St. George, N. B.

A GLIMPSE AT MAORI ART.

By R. M. Fripp, F.R.I.B.A.

Head of Chief Patara.

The advent of the missionary and the rum bottle, the British trader and his Brummagem wares, quickly followed by Tommy Atkins and the burning of powder in a heathen land, is so generally considered, by good Christians at least, to confer untold blessings upon the benighted savages thus honored by these advanced guards of civilization, that it is somewhat difficult to make it believed that the moral, intellectual and substantial gain is not all on the side of the poor barbarian; certainly, as in the case of the Maori for instance, cannibalism has passed away, but so too have about five-sixths of the natives, who, once a martial valiantrace, having received the Gospel, have ceased to fight any foe but consumption, which up to now has scored an all too easy win. Less than half a century back these "benighted savages" were daring seamen, building canoes 80 and even 100 feet in length, to beautiful lines and decorated with magnificently carved prows and stern posts, cunningly wrought paddles and sails prepared from native flax coaxed and softened almost to the texture of spun silk. Then, too, these people fortified their simple villages with a skill that not infrequently baffled British generals and British troops and caused them to spend many weeks before these outlandish defences on which guns, both great and small, failed to make much impression, indeed those so called untutored savages offered to our arms as noble a resistance as was ever made by a gallant people to the hosts of the invader. The entrance to the Maori Pah was through an elaborately carved wooden gateway surmounted by grotesquely hideous figures of idols; their meeting houses were enriched with a lavish display of the carvers' art, for the walls, gables, rafters, purlines and ridge poles, eaves and porches all called forth the best powers of the native artist, who revelled in curious scrolls and intricate conventional forms. The great chiefs delighted in the possession of Whare puni or dwelling houses scarcely less magnificent in scale and richness of decoration than the meeting house, and the Pataka or raised storehouse was in many cases superior to either in point of finished building and ornamentation; but we have changed all this, and the Maoris have forsaken their Pahs on the healthy hills to dwell on the more easily accessible low lying lands where rheumatism and pulmonary complaints wreak havoc among old and young. For the picturesque meeting house is substituted a vulgar little weather-board church to which a horrid clanging little iron bell summons the remnant of a tribe to go through the outward forms of a religion with little enough, if any, real appreciation of the noble ethics which lie concealed beneath the accumulated mass of mystery and mumming which 19 centuries priest craft has heaped upon them. For the dignified, well constructed and highly artistic Whare puni we find crazy, ill built houses or rather shacks of inch thick weather-boards, with galvanized iron roofs, which, hot in summer and cold in winter, take the place of warm thatch; hideous mill stock doors replace the carved architraves and stoutly clamped door of past times, mill made fret work that is not more flimsy than villaneous in design has displaced the side and well carved slabs, and so on ad nauseam. The thick, soft, warm capes and cloaks, made of dressed and stained flax, which were absolutely impervious to wind and rain, beautifully stained and colored, ornamented with feathers of that strange, wingless bird the Kirri, have given way to poor, shoddy tweed trousers hitched up with one half of a brace, and to coats, dresses and head coverings of the ordinary type which give their wearers a wretched appearance, in sad contrast to that presented by the fathers of the later generations before they were made acquainted with all the blessings of civilization. The Maoris generally lived in a Pah or native village situated on a piece of rising ground commanding a fine view of the surrounding country, not that the natives cared so much for the fine prospect as for the means their elevated position afforded of detecting the approach of an enemy. The Pah was always surrounded by a high and strongly staked fence or palisade, and was often strongly entrenched. The gateway was a great feature, and Fig. 1 is a fine specimen and is made of Rata wood carved with stone tools, and colored with kokowai, a red earth which is burned, ground to a powder and mixed with fat. The eyes are of Pawa shell as were the eyes of all the Maori carved figures. The wooden pins which fasten them in their sockets project slightly and are colored black and so made to represent the pupils. This gateway, the opening of which is over seven feet in height and nearly three feet wide at the base, once adorned the entrance to the famous Putterau Pah at Rotorua. Similar gateways were frequently carved for large Pahs and were furnished with strong doors that were securely fastened on the inside.

Fig. 2 represents the upper portion of another typical gateway and has been severed from the lower portion, which had unfortunately become so greatly decayed as to necessitate its removal.

The simplest form of dwelling was and still is the Raupo Whare, or a hut, usually of one room, built with a frame, the studds or uprights of which were driven into the ground and to these were lashed top plates and vertical stringers; the lashings being made with New Zealand flax (phormium tenax), a broad leaved plant which is found in every swamp. The roof was always gabled and prepared for thatching, the rafters and purlines being lashed together. The framing throughout was usually of Manuka scrub, a tough, stringy hardwood of a fine red color, and is now sometimes used for turnings when straight enough. Rushes known as Raupo, or native bullrush, which grow in the swamps and all the margins of the lakes to a height of 8 to 10 feet, are cut and dried in the sun, and the walls and roof were well thatched with it and often beautifully laced with flax. Fig. 3 shows a specimen of the roughest form of Maori Whare. In a particularly fine Runanga or meeting house, the rafters and purlines are all carved or painted with kokowai, and the central column supporting the roof is richly carved at the base, and the great lizard descending is the finest bit of work of its sort that I have met with. The walls

For figures referred to in this paper see illustration sheets.

are covered with thick matting prepared from reeds and is quite equal in design to much of the Japanese matting. The roof is maintained beautifully smooth and straight on the under side. Fig. 4 is another splendid example of the highest class of raupo whare. The lower edges of the large boards are exquisitely cut and the lower ends are also good. The teko-teko or finial is quite characteristic, as are also the great carved upright posts. The lintels and architraves of the door and window are not so well executed as the rest of the work, but the plinth at the base of the raupo wall thatch is capital. The window and door are modern and speak for themselves. The verandah is about 4 ft. 6 in. wide and a straight round log rails it from the outer ground space and gives it an increased air of completeness.

The most advanced dwelling was the Whare puni. An excavation from two to four feet in depth was first made, usually on a dry, sandy place, and the walls and roof were built over this basement and the excavated earth was banked up against the walls on the outside. Down the center ran a sort of path about 4 feet wide, distinctly marked with wooden kerbs; on the right and left the people made their beds, sleeping with their heads to the outer wall and feet to the passageway, in the center of which stood the fire place, which consisted of a hollow scooped out of the earth. In this hollow were placed stones heated at a wood fire burning outside the house, and it is surprising how intensely warm the building thus heated sometimes becomes. I passed one very wet night in a large house then belonging to a now long deceased chief of the Ngatimaniapoto. There were about thirty-five natives assembled there, all of them smoking, women as well as men. The stone fires were maintained vigorously, the doorway closed and mats and rugs piled up in heaps. I bore the intense heat until the perspiration poured from me and I was half suffocated and reeling with giddiness, while the Maoris seemed to enjoy what was to me an aggravated Turkish bath. I slept on the verandah, preferring the rain to asphyxiation

The Pataka or raised store houses were the show places of a village, and on these were expended the greatest labor and skill. Every portion of the gable ends was richly carved, the figures illustrating mythological legends, the significance of which is almost lost. The influence of the Pakeha or white man is shown in some of the work of the early part of the century—in one instance the Teko Teko wears a low crowned bell topper; the effect is most ludicrous. The Pataka was always set on stilts to raise the building about four feet off the ground, erected in fact on the same description of foundation as bears the ordinary frame or timber house of the white New Zealander. The Pataka being merely a place in which food was stored out of reach of the once numerous native rat, was necessarily not a large building. Fig. 5 gives a fair idea of the usual proportions. This Pataka has a history, being originally the property of Haere Huka, a chief of the Arawa, and was erected on the shore of the lovely Rotoiti lake. The sideboards and inner fronts were executed about 1825; the large boards and Teko Teko are probably a few years later. Haere Huka, the original owner of the Pataka, is well known in Maori history as the treacherous murderer of Hunga, a chief of the Ngatihana tribe, at Parihaka, Rotorua, on Christmas day, 1835. This incident and the blood thirsty war that followed it and lasted until 1840 is fully related by W. J. A. Wilson in his life of Te Whahawa.

Fig. 6. This is a particularly large specimen of a Pataka and the carving is peculiarly bold in character and deeply cut, the eyes are all of pawa shell and the woodwork painted with kokowai. The eaves are formed by enclosing the feet of the rafters with an elaborately carved fascia board and a plain soffit board, and it is curious to note that the colonial builders have adopted this manner of finishing the eaves of their timber houses, merely adding gavlanized iron eaves spoutings spiked to the fascia, and ugly mill brackets beneath the soffit, and is, with a few trifling variations, almost the universally adopted method in these islands. In fact, it is not too much to say that the Maori as an architect was a much better artist than his white successors are.

Fig. 8 and 9. Carved front of a Pataka.

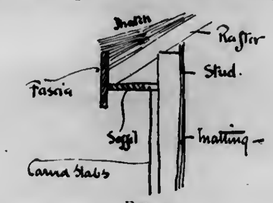


Fig. 9.

Fig. 10. Two doorways of Patakas; carved wall slab. Two very small Teko Teko. The broad bladed instrument is a ko or spade, the other objects are spears.

Fig. 11 is the most ancient piece of native carving known to exist in this part of the island. I have been unable to ascertain what it represents or what purpose it filled; the carved ground behind the figures is pierced. The wood is black with age and the eyes have all fallen from their sockets.

Fig. 12. Carved entrance to a Whare puni.

Fig. 13. Carved prow of a canoe.

A Maori war canoe when fully manned must have been a fine sight; even now a race between three or four canoes with fifty or sixty paddlers in pairs, all stripped to the waist and dipping their paddles in remarkably precise time about fifty strokes to the minute, each stroke accompanied by a gutteral Hugh! Hah! and excited by the song of the chief who stands in full costume in the stern, every man digging away with wild energy, throwing the foaming water from his blade, each canoe seems to tear along; first one gains a trifle and then another, until one crew perhaps in rather better condition than the others slowly forges ahead, the old chief stamping his feet and yelling encouragement to his men, who spurt with a splendid vigor, their paddles flashing like one in the sun, once in every second. The other canoes, still urged madly along, fight desparately for second place. The winners slap their chests and wave their paddles and one obtains a fleeting glimpse of the old fighting temper for which this dying race was once so famous.

It was perhaps in their canoes the Maoris best displayed their mode of carved decoration; the prows and stern posts are wonderfully delicate; the double spirals being pierced, the effect is very light and lace like. The origin of the double spiral was two snakes, as may be seen by examining ancient examples, in many of which the heads of the snakes form the eye of the spiral, the heads being finished with mouths, teeth, and pawa shell eyes. These snakes have a mythological origin which has been gradually lost as the snakes become more and more conventionally treated. Comparatively early

divergence from the true snake forms is well exemplified by the carving of the feet of the bargeboards of the Patakas in Figs. 5 and 6, and the development may be observed in the feet of the bargeboards in Fig. 4. The latest and highest development of the form is indicated in the quartered and pierced spirals in the canoe prow, Fig. 15, which is considered the finest specimen in New Zealand.

The Maori war canoe (Fig. 14) Toki-a-Tapiri was built by the Ngnatikahungunu tribe located between Gisborne and Napier about 1835. It passed into the possession of the Ngatiteata who dwelt on the shores of the Mannkan harbour, the bar at the entrance of which is one of the most wild and desolate, as well as dangerous, in this country. It was here H.M.S. "Orpheus" was wrecked. The canoe was taken from the Ngnatiteata in 1863 by a detachment of the colonial forces under Capt. Lloyd during the Waikato war.

The over all length is 80 feet, greatest beam 7 feet; the hull, top streaks or wash boards and all the carving are of totara, a comparatively light timber straight in the grain and very durable in water and of a rather rich red color.

The method of constructing a great canoe may be of some interest. Firstly, a suitable tree was not to be discovered without much search in the forests, and the position of the tree when found had to be carefully considered, for a stick about 100 feet long and 8 or 9 feet in diameter is not easily taken out of the woods by a handful of simple folks who knew not of greased ways or timber shoots. The giant of the forest was laboriously laid low by relays of men armed with stone axes, and was minutely examined when fallen, for if seriously "shaken" another tree must be found and all the work recommenced. Should, however, the great trunk pass inspection it was cleared of its branches and removed to the village. The hull was then roughly lined out and hollowed partly by burning and partly by dubbing with stone axes. The hull having been completed the wash boards or Ranawa had to be cut from trees almost as great as that which provided the hull. The labor of working these down to the required thickness, especially if carved from end to end as in this instance, must have been immense. Holes had to be bored through the Ranawa and through the sides of the hull, through which the flax lashings were passed to bind them together, and the magnitude of this minor operation is better understood when it is explained that the only implement of the nature of an auger was a stick armed with a piece of quartz.

Then followed the carving of the figure head (Fig. 16), and of the stern post (Fig. 17), and as these were cut out of solid slabs and only a little could be done at one time lest the timber should split, years often passed before they were completed. The thwarts or Taumanu were prepared and firmly lashed to the gunwale on each side.

The work of preparing the flax fibre was always performed by the women, who also plaited the sleeping mats and made the baskets in which the provisions were carried.

Lastly, the seams and holes through which the lashings passed had to be caulked with the feathery down obtained from the head of the native bullrush (the ranpo), and the whole canoe painted with kokowai, and the canoe was ready for sea. The paddles, usually made from a hard, tough scrub, were well shaped, smoothly finished, very handy to use, and sometimes the ends of the handles were carved. The ends of all the thwarts of the toki-a-tapin were carved with heads, and gratings cunningly formed of straight pieces of Manuka about an inch thick laced together and resting on cross pieces, enabled the paddlers to keep their lower limbs and their belongings well above any water that found its way in through leaks or dashed over the sides.

One of the most striking features of the canoe here described is the delicacy of her lines and the slight but well defined sheer. As sea boats these vessels behaved excellently, and long voyages were frequently undertaken on these rugged and storm beaten coasts.

Fig. 18 gives us an example of another well known treatment of figure head.

To properly illustrate and describe all the various phases of Maori art is a task which would richly reward who so might undertake it, but my aim has been merely to show that Maori art possesses much of interest in itself and was of no mean order in its way. I am obliged to omit the examples which mark the ingenuity, patience and skill expended upon minor articles of domestic use, such as feather boxes, walking sticks, water vessels, combs, knives, fishing gear, eel traps, nets, wearing apparel and arms of wood and stone, personal ornaments of jade, stone or wood, and scores of other things which help to prove that the natives of these islands were cultured in their tastes to a degree quite surprising in a people addicted to cannibalism, engaged in perpetual warfare and sunk in gross superstition.

COST OF HIGH BUILDINGS.

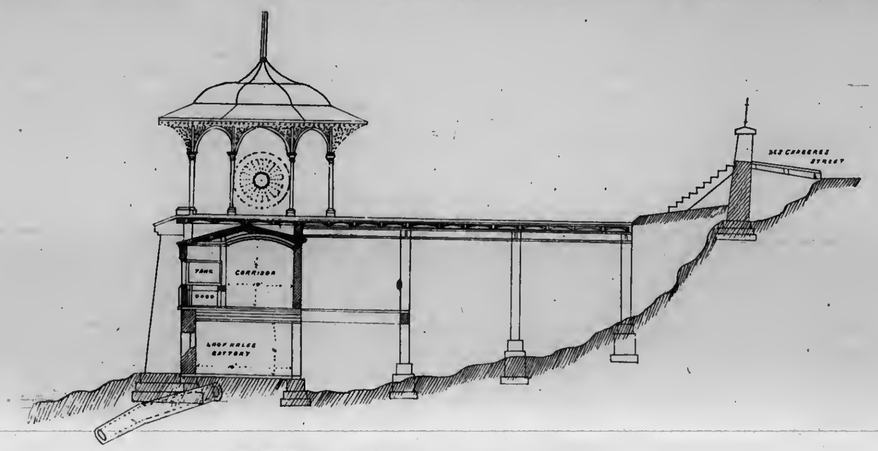
Mr. Richard Pelham Bolton read, recently, before the American Society of Mechanical Engineers, some interesting statistics in relation to the cost of high office buildings and their equipment. Including a moderate amount of exterior ornament, the cost of a building sixteen storeys high, with steel frame, and, of course, fireproof construction throughout, and inclusive of plumbing appliances, elevators, boiler-plant, pumps, heating apparatus, electric light wiring for isolated service with switch boards, engines and generators, is, in New York City, from thirty-six to forty cents per cubic foot, measuring to the outside of the walls. Higher buildings cost proportionately more, and, of course, any sum may be spent on exterior enrichment. About one-seventh of the entire expense is in the boilers and engines, heating and lighting apparatus and plumbing. These must be of the very best type if the building is to be profitable, for the saving of the repairs required for inferior apparatus, and the economy of fuel which can be secured by using triple expansion pumps and compound engines, represent a large proportion of the balance of income left over after deducting taxes and mortgage interest and necessary expenses. Even in the matter of fuel, a little forethought is a valuable investment. Nearly all the high New York buildings have coal-bin capacity only for two or three days at most, and many of them must have coal delivered every day. Under such circumstances, the cost of their coal is greater, while they are at the mercy of sudden strikes, or heavy snowstorms, which may expose them to the dilemma of paying extortionate prices for fuel, or damages to their tenants. In the Bowling Green building the capacity of the coal bins is four hundred and twenty tons, and this fact enables the managers to save about ten cents a ton, on an average, in the cost of their coal, and, probably much more, indirectly in the assurance of an ample supply.

A PROPOSED AQUARIUM UNDER DUFFERIN TERRACE, QUEBEC.

To the Editor of the Canadian Architect and Builder:

Dear Sir,—The accompanying sketch is that of a cross-section of an aquarium for Quebec. The site is admirably adapted for the purpose, the height under the terrace being some 20 feet; so that the housing corridor—15 feet wide by 10 feet high—would leave ample space beneath it for defense of city through the loop and port holes in the lower 10 feet. For the present the extent of aquaria tanks, end to end, would be some 700 feet or more, ranging between the terrace piers or buttresses from the second kiosk (the Lorne and Louise) to the fourth entrance and exit thereto and from, being at and under shelter of these by a spiral stairway 8 to 10 feet in diameter at centre thereof, and hermetically protected from wind and weather by a circular glazed enclosure of that diameter and proper or proportional height—the ground plan of stairs shown on section to save space of another diagram.

The front wall of terrace is made up, above the 10 feet lower wall where the loop holes are, of a series of buttresses at 20 feet centres, say 4 to 5 feet wide and leaving 15 to 16 feet clear for the aquaria tanks, which would have an aggregate length of some 500 feet. These would be as usual, of heavy plates of glass cemented into grooved iron framework, with wrot iron 1-4 inch bottom plates riveted to framing, water tight cisterns say 4 feet wide and 4 feet high, resting on a continuous table of proper strength to support the weight—upper surface of tank open for aeration



Proposed Aquarium Under Dufferin Terrace, Quebec.

either by lifting out some of the water and dumping it in again from a higher level to cause it to stir up the body of water in the tank, or by a jet of water under pressure from a pipe above, penetrating the contents of the tank and thus restoring the oxygen taken in by the marine and fresh water fauna: fish, crustacea, zooplytes, mollusca, etc,—the oxygen being also supplied by vegetable growth or plants, which, as is well known, take in carbon and give out oxygen under the influence of sunlight.

A somewhat detailed estimate of cost figures up to about $9.00 per feet lin. of housing corrider, or for the 700 feet	$ 6,300.00
500 feet tank at $14.00	7,000.00
Two heaters and piping	2,500.00
Two entrance kiosks and stairways	500.00
Total	$16,300.00
The yearly cost would be:—	
For interest on capital at 5 per cent	$ 815.00
105,000 cubic feet of space to heat at 20 tons per 20,000 feet	630.00
Salary of specialist	1,200.00
Wages of stoker and helper	600.00
Cost of common salt, Epsom salt, chlorate of magnesium and chlorate of potasium for artificial sea water, for say 300 ft. lin out of the 500 ft. of cisterns	200.00
Total	$ 3,345.00

It is argued that as an educational feature, governments—Imperial, Federal and Local—might contribute to construction thereof, and that an average 20 cent entrance fee would cover yearly cost for interest and maintenance. The entrance fee at Brighton, England, is, I believe, 50 cents, those who visit it under invitation by the city authorities having, of course, nothing to pay. This aquarium is more than 700 feet in length by 100 feet in breadth—or was at the time I went through it in 1874—but the ground covered also contains a conservatory, a library, reading and lecture rooms, etc.

There is also an extensive aquarium at Sydenham—some 6 miles from London. It is in the old so-called Crystal Palace erected by Sir Joseph Paxton for the London Universal Exhibition of 1851, and thereafter removed to Sydenham, its length being 1800 feet and beight of dome or ceiling over nave 100 feet.

Contributions to the required salt and fresb water fauna and flora to be exhibited would no doubt be had from the above mentioned aquaria, as well as from those of Naples and elsewhere; the Marine and Fishery Departments of our Federal and Local Governments also helping us in the process of procuring the necessary exhibits. The larger species, the porpoise or white whale, sea lions and other such mammalia, with such entities as the shark, the dolphin, etc., if procurable, can be accommodated in an excavated reservoir or tank of adequate depth and size at the Victoria Park, and housed in, of course, under a glass dome as a conservatory, where the proper heat may be maintained at all seasons and the water cooled in summer by the now liquid air process of refrigeration.

We have just finished, or nearly so, as suggested by the writer some twenty years ago, an 1800 feet sidewalk or promenade some 12 feet in width around the foot of the citadel walls, and when this promenade is completed, reaching as it does from the south end of the terrace to and along the crest of the cliff to the old French fortification mounds at Cape Diamond, 330 feet above the St. Lawrence, when this is done and the Aquarium built, it will then be true to assert, as Princess Louise said at the time the Marquis of Lorne inaugurated the terrace, that, "it is the finest promenade in the world," congratulating the undersigned the while on its constructive, pleasurable and emotional features.

C. Baillairge,
Architect and Engineer.

ARTS AND CRAFTS ASSOCIATION.

A meeting of those interested in the formation of an Arts and Crafts Association in Vancouver was held in the rooms of the Vancouver Builders' Exchange on April 25th, at which steps were taken to form an association. The objects of the association are: The greater encouragement of the arts and crafts; the association of those engaged in these pursuits for their mutual benefit and education, together with the collecting of examples of arts and craftsmanship, and the establishment of a library of reference.

The provisional committee consists of R.M. Fripp, F.R.I.B.A.; S. M. Eveleigh, architect; A. Woodroofe, architect; James Bloomfield, designer.

Mr. C. G. Horetzky, who for many years was employed by the Ontario Government as a civil engineer, died in Toronto a fortnight ago.

SPECIFICATIONS.*

THERE is one word in a specification of which the meaning is often disputed. It is the word "best" when applied to workmanship and materials, especially to materials, and is, I grant, somewhat ambiguous. But I would not use such terms as "best," "finest," "extra best," super best," best best," and so on ; but merely employ the word best once and for all and attempt to define its meaning. Here is a suggested definition of this word : "The word 'best,' as applied to materials, articles and workmanship, shall mean that there is no superior quality of material or finish of article in the market, and no better class of workmanship obtainable." In fact, by defining this word "best," it will only be necessary to mention it in the one clause when stating that all materials and workmanship are to be of the best quality and class.

MECHANICAL DEFINITIONS.

We are all apt to fall into the error of describing certain materials mechanically, such as timber from a market which has long since been entirely exhausted, or stone from a worked out quarry, or we use misleading and exaggerated language, "timber free from knots," demanding what, in our own minds, we never expect to obtain. We should only specify what we can get, what we mean to have, then see that we get it. At the same time we must not lose sight of the fact that our endeavor must be to obtain the most suitable and best material procurable in the market, and that the work when executed shall be a credit to all.

SUB-CONTRACTS.

As to the question of sub-contracts, this would take some time to discuss, but, as a general rule, let a sub-contract go through the general contractor ; but when this is impossible, then make the sub-contractor subject to all the conditions of the main contract equally with the general contractor, and in the main contract stipulate that the general contractor is to give every facility to the sub-contractor, and allow him the use of his scoffolding and plant.

ARRANGEMENT OF STAIRS.

Having now, so far, settled the general scope and bearing of a specification, the next step is to put the various items into order and place. As I have before said, we cannot do better generally than to divide the specifications into separate headings or trades, as they are called. As to the order in which these trades should be placed, I do not think that very important, only let each trade, if possible, come in the order in which the building would be erected.

Thus the specification would be started with the preliminary items or general clauses, under which heading would come every item that would apply to the building generally as a whole. Then would follow the trade of excavator, this being the first start of the actual work. Then the trades embracing the structural parts of the building, such as bricklayer or mason, whichever trade would chiefly apply to the walls. In like manner you would go on constructing the building on paper until it was roofed in, when the trades taking the interior fittings, finishings and requirements would follow, and finally the decoration and painting. As to what items each particular trade should embrace or how many trades the specification should be divided into, that to some extent would be a matter of convenience and clearness consequent on the nature of the building in question. Thus, if pavior is a considerable item, make it a separate trade, but if a very minor point then the paving may come under the trade bricklayer. Again, if the drainage is a large item I would make that a distinct trade instead of putting it, as is often done, under excavator. Further, floor and wall tiling might either come under pavior, bricklayer or plasterer, as each of these trades, in certain parts of the country, is performed by the same class of workmen. Many other items may be treated in the same manner. Each trade is started with a preamble, or the general clauses most applicable to all the items under that trade, such as the description of the various materials, and the general covering clauses referring to similar parts of the work in different positions, after which follow in detail the actual items of work. Strictly speaking, a preamble is an introduction or preface ; but in a specification the term is applied in the sense of denoting the general clauses and descriptions at the beginning of each trade. Going more fully into the various items of almost similar description under each trade, I think the best plan, in most cases, is to describe all the items of a similar nature to each floor separately, from the lowest to the topmost story, continuing with other similar items on each floor. But if the description of any item will apply equally over the whole of the building, describe it so, without reference to each separate floor, and thus save useless repetition. As to the exact order of the various items under each trade, I would put them as far as possible in that order in which they would be built. But there is no hard and fast rule to follow in this respect, as in many cases it will be clearer to run them on, regardless of that order. When describing the items do not omit to mention the class of material ; thus state the particular quarry and bed of stone, give the class of wood for the timber and joinery work, and state whether it is rough or wrought. A general clause, such as this, "that all exposed faces of timber and joinery work, except where otherwise mentioned, are to be wrought," will save repetition of this word "wrought." State if you mean Portland or other kind of cement ; the word Portland is often omitted. And all other descriptions of materials should be clearly defined.

Reverting once more to what may be considered the best order in which to place the items of work under the various trades, I know that this is one of the chief difficulties of the beginner, and I will sugest an arrangement for some of the principal items. I have before mentioned that, as a rule, it is best to specify the items in that order in which the work will be built, but that it is not always possible to carry out that order. But I would say that, whatever order you once adopt, always follow in all your specifications and in all its parts, so that you will know yourself where to find an item. I have also said that each trade in every case should start with a preamble, or the general clauses and description of materials. Now to take the principal items under the various trades respectively. In preliminary items I do not think any particular order is essential, but it would be as well to keep the clauses in that order which would mostly run with the order of the work to the building. If old buildings have to be removed the description would come under this heading of preliminary items. But if a housebreaker is employed then this work would form a separate and distinct contract by itself. In excavator take the surface excavation first, then the deep excavation, such as that to basements and cellars ; then the general excavation to the founda-

*Extracts from a paper read before the London Architectural Association by F. W. Macy.

tions and the attendant items, such as planking and strutting, filling and ramming ; and, finally, any other small or particular items. Then describe the concrete foundations, after which the surface concrete and any brick rubbish under, then the concrete floors, roof and stairs. If the walls of a building are in concrete, I would take these immediately after the concrete foundations, of which they then would almost form a part. Under drainage describe the manholes first, then the pipes with the concrete, then the gulleys and other similar items. The items under the trade of pavior are so simple that any order might serve, but take first the important items of internal paving and follow on with the smallest items, and finish with the external paving.

In bricklayer commence with the general walls of the building, then the damp course, hoop iron and other attendant items. Then those parts in cement, such as rough arches, trimmer arches, piers, sleeper walls, half-brick walls and dry areas. Then the external facings and pointing, gauged or other external arches, dressings, moldings and ornaments, external glazed brickwork or flint facings. Then the internal facings and pointing, glazed brickwork and wall tiling. Boundary and retaining walls, and such-like distinct items, should come last, and be described separately and completely by themselves. Terra cotta facings might either come with other external facings or be kept as an item by itself after the description of the other general work, and before such items as boundary or other walling.

In mason commence with the rough stone, such as templates and corbels, if not elsewhere described, and follow on with the thresholds, sills, copings, internal pavings, staircases, hearths and chimney pieces. Then the external paving, steps and curbs. If the walls are built or faced in stone, I would describe these first completely, with all the labors, moldings and ornaments on them, and then follow on with the rough stones and internal items, and finally with the external items, such as pavings, steps and curbs. I would not trouble to keep all stone of a similar nature under the one heading, unless it should happen to come in that order.

Many make carpenter and joiner two trades. In a large work perhaps it is better to separate them, but in a small work I should certainly keep them together. But it is immaterial whether they are separated or not as long as the descriptions are clear. Personally, I prefer them generally under one heading ; you will perceive the reason from the order of the items I will now give you under these trades. Lintels, breast-summers, posts, cradling, floor and ceiling joists and plates, sound boarding roof or flat timbers, felt, battens, gutters, and all external joiners' work to the roof or flats, except windows, doors and skylights, such as rolls, fascias, large boards and such-like items. Then would come quartered partitions, followed on with flooring, windows, skylights, external doors, internal doors, framed partitions, skirtings, dadoes, wall and ceiling panelling, staircases, sinks, and water closets ann bath casings, and other internal fittings, such as shelves, cupboards and such-like domestic fittings. Fencing, weather-boarding or other outside work should be complete items by themselves and come last. Half-timber work with all its attendant items might, I think, come after the description of the rough timbers. I would not separate hardwoods from softwoods, but describe them as they come on each separate story.

In smith and founder take this order : Lintels, chimney-bars, straps, girders, floors, columns, roofs, carriages, iron windows, gutters, stack pipes, external railings and gratings, stoves and ranges and heating. Heating may come under heating engineer.

Under slater and tiler, roofs first, then vertical slating or tiling, shelves, cisterns and such-like smaller items.

In plumber, take gutters, flashings and other roof finishings, flats and their gutters and finishings, then drinking water supply pipes, cisterns, sinks, lavatories, baths and fittings. Then water-closet supply pipes, cisterns, water-closets, slop sinks, urinals and fittings, soil and ventilating pipes, hot water circulation.

ZINC WORKER AND COPPERSMITH.

Take flats, gutters and finishings, pipes, lightning conductors. In plaster describe first the general plaster work to ceilings, partitions and walls, then follow with cornices, coves, center flowers. Then those parts in cement, and finally the external plaster or cement work, or, if preferred, take the external work first.

GLAZIER.

External glass to sky-lights, windows, doors, then internal lights and screens, and pavement lights last.

PAINTER AND PAPERHANGER.

Internal work to ceilings, walls, wood and ironwork and polishing. Then external painting to wood, iron and cement work. As to the order in the trades I have mentioned, such as bellhanger, gasfitter and electric lightning engineer, which are not generally of any considerable variation, there is very little to suggest, but keep the order of the work, such as the main items first and fittings afterwards. I might mention that the order adopted in bills of quantities is not precisely the same in all parts as that of the specification. The order in quantities is placed to an extent to facilitate the pricing, and the order in the specification should be to distinguish quickly the position of the work.

PRICES.

One word before I come to the last part of this paper. If the prices in a bill of quantities are not to be taken into account in the settlement of extras and omissions, or if quantities have not been supplied, then a schedule of items should be provided for the builder to fill in, and be attached to the specification and form part of the contract upon which variations may be valued.

ADDITIONAL HINTS.

I have now, I think, stated the various points which are necssary to be observed for efficient specification writing, and I will just mention a few matters which are worthy of attention and which are not always found to be clearly stated in a specification, but are sometimes omitted altogether, taking preliminary items first. Always state that the plant and temporary erections are to be removed when directed, such as scaffolding, hoarding, shorting, clerk of work's office, and any other items temporary in their character. The provision of these items is usually stated in the specification, but their removal is not always mentioned. State if the hoarding is not to be let to an advertising contractor. Clearly define what you mean by prime cost and provisional amounts. State if the employer's business is to be carried on during the building operations. Mention that the contractor is to give due facilities to other tradesmen who may be employed on the premises, and also that the contractor is to allow such other tradesmen the use of his scaffolding and plant. State to whom

any coins or curiosities found on the premises or during excavations are to belong. If the contractor has done any work previous to signing the contract, then embody this work in the contract, otherwise an extra may be claimed for some small items which at the time of signing the contract were understood to be included in the contract amount.

EXCAVATOR.

Where the foundations in a length of walling are not all one level, require the excavation to be in steps and not on the rake. Stipulate that there should be no excavations for ballast or sand unless necessary for the actual excavations, as this may affect the stability of the building. Specify that brick rubbish be put under surface concrete which receives wood block flooring or paving. There will be less liability of damp coming through. In clay soils require the foundations to be taken down below the action of the weather. This may necessitate the foundations being taken down some four feet, five feet or six feet below an otherwise good bottom. Specify a proportion of coke breeze, slag or gypsum in concrete fireproof construction. It will the better resist the action of fire. State that all foul earth and cesspools are to be removed and the excavation filled up with clean rubbish or concrete. Encase new drain pipes in concrete ; if a slight settlement occurs they will the better hang together. Half channels in manholes are better formed in cement than with half-pipes. A cleaner flow of sewage can thereby be obtained. Then as to the items under bricklayer. Do not forget to mention these points : To tie the walls in ; build external walls hollow, if possible, but in damp situations certainly ; and specify the lead covering over the heads of the doors, windows or arches coming within the hollow space. This will prevent the wet being communicated to the inner thickness of the hollow walls. Describe a weather joint externally to brick walls. Build the brickwork up in even heights and fill up all the joints. Let the sand be free from dirt and the water clean. Sea water or sea sand may be used where dryness is not essential. Build chimney stacks, where they appear above the roofs, either partly down from the top or else wholly, in cement, preferably the latter. Build all parapet walls and the brickwork immediately under the eaves a certain distance down in cement, and a second damp course here and to chimney stacks will not be amiss. Half-brick walls should, of course, be built in cement. Boundary fence walling should have a damp course, and preferably be built in cement. In retaining walls against earth do not omit the weeping drains or other device for taking off the accumulating water at the back. Smoke flues should not be too large—nine by nine inches is sufficient for most fireplaces ; and gather the brickwork quickly over the fireplace openings. Build all stoves around solid, and fill up the boxing to chimney pieces. Fires have often occurred through neglect of this precaution. Do not put too long a description to terra cotta work because it may be the custom. Put a straight joint between connecting walls and a heavy tower, and do not attach a large chimney shaft to the main structure.

MASON.

Stone templates should be of considerable area and tooled and not left rough. In fact, any stone upon which work is built should be tooled as a least labor on it. Do not forget the cement packing between the rivet heads on top of flange girders and the cover stones. Stone hanging steps are almost better placed in position and pinned in after the building is up, sand courses being left in the brickwork for the purpose. In stone columns or pilasters the apophyges should be worked on the shafts. The effect is better. Portland cement will stain delicate marbles and some limestones.

CARPENTER AND JOINER.

When possible employ wood block flooring on the lowermost floors next the ground. The ordinary joists and flooring for this position are more liable to decay. In this latter case let the joists and plates be of oak. Put cast iron shoes on stone bases to all solid door frames. Bed window sills on to the stone sills in white lead, and do not omit the iron tongue. The cleats to roof trusses and horns on solid door frames are sometimes forgotten. Snow boards to roof gutters will often prevent wet penetrating when snow melts. Open casement windows outwards if you want to be perfectly sure of keeping out the wet. The ends of timbers, where bedded in walls, should have circulation of air around them. A little sap on the edges of timber exposed to the air will not be any very great sourch of weakness, and will not be likely to affect the rest of the timber. All gutters should be wide enough to walk along. Small angle fillets at the junction of horizontal and vertical planes of a roof flat will make better work than if the lead work be turned up sharply. This remark will also apply to lead gutters. In some cases it is almost preferable to put a p. c. amount for the ironmongery to each door, window or other fitment and select the class of ironmongery afterwards.

SLATER AND TILER.

Tiles and slates without boarding under should be torched.

SMITH AND FOUNDER.

Let rain water pipes stand out one inch clear of the walls.

PLASTER.

Timbers over three inches wide should have the arises taken off before the lathing is nailed on; this will enable the plastering to get a better key. The walls at the back of skirtings, or any other woodwork, should be plastered over to prevent vermin harboring. The outside of all flues between timbers, floors, and where in the roof should be roughly rendered over. This will be a preventative against fire. Shingle laths should not be lapped at the joints, as is often done.

PLUMBER AND GASFITTER.

Do not omit the exhaust pipe to hot water circulation or to the heating arrangements. Keep all hot and cold water pipes well away from each other and from the action of frost. All pipes, whether gas or water, should be readily accessible and, if possible, on the face of the walls. The furring up of hot water pipes is chiefly found between the boiler and the circulating cylinder or tank This portion of the piping should be easily accessible for cleansing. All horizontal gas pipe should be laid with a fall to prevent any condensed liquid remaining in any part of the pipes, and thereby affecting the efficiency of the gas supply. It is a good plan to fix all internal pipes about three-fourths of an inch clear of walls, especially hot water pipes. Do not work the hot water supply and heating arrangements from the same boiler. Failure is almost certain.

GLAZIER.

All glass subject to jars should be bedded in wash-leather or India rubber, as well as in putty. I might mention that one of the best methods for glazing skylights is merely to seal the glass on a bedding of putty, and then to sprig it in and paint the joint over with the woodwork of the bars. It is perfectly watertight, and there is no putty on the weather side to get out of order. This plan is much adopted in horticultural building, both vertically as well as in the top-light glazing. The laps of the glass to the top-light should be cut to a curve, the water being directed down the centre of the glass and away from the rebate in the bars.

PAINTER.

External painting if done in the spring or autumn will give a more satisfactory result. No painting, papering, or other decoration should be done while there is a suspicion of dampness about the building. All ironwork should be well painted over before it is buried or covered.

THE ENGINEERS' CLUB OF TORONTO.

THE regular meeting of the above club was held at the Rossin House on Tuesday, May 1st, at which there were present : Messrs. Tully, Patton, Canniff, Lambe, McDougall, Johnson, Roy, Withrow, Galbraith, King, Butler and Chipman.

The secretary reported that the special committee appointed at the last meeting to make arrangements re club rooms had interviewed Mr. Horne, the proprietor, and Messrs. Gregg and Gemmell, of the Association of Architects, and that the committee was informed that the plans for the rooms would be fully completed at an early date, when they would be submitted to the Club for approval. A draft plan was submitted showing the proposed sub-division of the floor into rooms.

A resolution was carried that the draft plan submitted for consideration by the architects be changed as follows : (1) That there should be a landing in the stairway and no "winders" ; (2) Skylight to be built over stairway ; (3) Platform and blackboard to extend the full width of the room ; (4) Fireplace in engineers' room; (5) Alcove in engineers' room ; (6) Ventilation, heating and lighting arrangements to be shown.

The following topic for discussion at next meeting was selected : "Freight Tariff on City and Suburban Tramways," by Mr. Jas. McDougall.

BY THE WAY.

AN Ontario architect who recently visited Winnipeg has given a glowing description of the climate in that city in winter. During a stay of several weeks the sun never failed to shine brightly every day. Owing to the clearness of the atmosphere the blue sky flecked with white clouds, seemed miles further from the earth than in eastern Canada. Nowhere else, save in Italy, is the atmosphere said to be so well adapted to the proper display of architecture. Shadows are strong and clean cut and mouldings and other features of buildings stand out with perfect distinctness. Light colored materials are considered best adapted to this climate, and are being employed in some of the more important works now in course of construction, notably the Bank of Commerce and the Dominion Bank, one being built entirely of terra cotta of a warm shade of brown, and the other of Ohio gray sandstone. While the atmosphere in winter is extremely frosty, it is said to be entirely free from moisture. It is consequently well adapted to the use of stone, which in the eastern provinces must be used more sparingly on account of the destructive effect of moisture in the air.

THE COMMERCIAL VALUE OF ART.*

BY A. O. ELZNER, F.A.I. of A.

ART is one of the greatest factors of civilization, and probably the oldest and most powerful. It is the very first refining instinct that becomes manifest in the savage ; it is the great force that carries him upward through the successive stages of enlightenment until he becomes a great nation, and the last to remain, long after a nation or a people has passed from splendor and prosperity back again into the obscurity of antiquity. It is an open book wherein we read men's thoughts and deeds, their rise, prosperity and decline. It is a faithful record of the triumph and failures of humanity, of its joys and sorrows. Rightly understood, it is the very soul of our existence. It glows as a halo about all creation ; appeals to and summons our full nature, and inspires us to lofty efforts, if we will but recognize its ringing message—that Beauty is truth, and Truth is Love.

Some of you probably read the account of the manner in which Gibson first succeeded in having his sketches of the American Woman received. He was young and modest and, when he had made a couple of sketches, left them anonimously in the editor's office of a newspaper. They were not appreciated, and were, of course, consigned to the waste basket. Again he left new ones, and again they were destroyed. This continued for some time, until it was finally thought they really might have some little merit after all. So they were published, and soon attracted attention. But still the artist remained unknown, although he continued to leave his sketches. Finally he presented himself at the office as the author of those pictures of women, and now he is famous the world over, and his sketches command an immense premium. What is the result ? Think of the thousands, yea millions of people who enjoy them, and are better men and women for it ; then think of the material influence exerted by reason of their publication.

Firstly, Gibson himself is making a great deal of money, by means of which he could, if he would, do much good in the world.

Secondly, the publisher's business thrives on account of their popularity ; this means the necessity of increasing his facilities, employing more hands, who welcome the boom with a full heart. It means further, that more paper and ink stock is needed on account of increased circulation, and forthwith the mills are taking larger orders, much to the benefit of those depending upon this branch of the trade, and the railroads doing better business, due to hauling the extra weight of stock.

And yet Gibson is only one of hundreds and hundreds of artists working in this manner, and whose influence extend far into the channels of trade, yielding support to hundreds of thousands that are engaged in some occupation whose very existence is dependent directly or indirectly upon the work from the fountain head. Such may be common laborers, mechanics at trades, machinists, engineers, draughtsmen, clerks, manufacturers, shopkeepers, dealers, landlords and bankers, brokers, real estate men, railroad magnates, and poor architects—when the publishing journal makes enough money out of the clever paper to erect a new building for itself, as was done in the present instance. I refer to "Life," which recently completed a splendid house of its own, and is probably now selling its paper very largely among all these people, who are enabled to support it by virtue of the reflex action of its own success.

Let us now anaylize a case of rather different character. I was invited recently into the rooms of a firm that makes a business of interior decoration—notably for fine dwellings. This firm naturally could not exist at all were it not that the public taste had developed a demand for beauty and refinement in our homes, and in fact to such an extent that experts are required to take complete charge of the whole interior. This is supposed to be the proper thing—but without intending in the least to disparage the skill of the artist, I would say that, on general principles, it is a very dangerous step to take, unless one feels himself utterly devoid of artistc ideas. For a home should be all that this beautiful term implies, and a home, in order that it may be beautiful, should reflect the individuality of the occupants and should above all be expressive of comfort and ease. Now these are peculiar terms and capable of various constructions. Primarily, comfort in a home, means the perfect adaption of its parts,

*Address delivered before a meeting of The Cincinnati Chapter Architects.

its rooms, its furnishings and size, to the habits and customs of the family for which it is built. Yet, how seldom we find this to be the case; and it can be truly said that beauty is incomplete where the purpose is not faithfully served. Just as surely as one person differs from another person in character and individuality, so does one family differ from another family, and so should one house differ from another in character and individuality. But if you stop to enquire, you will find that many people build houses, not with the expectation of living in them all the remaining days of their lives, or with the idea of establishing a homestead for succeeding generations, but rather with the fear that they may not be able to occupy it very long, and may have to sell it off some day, and consequently they build a house which, as the expression goes, would suit some one else that may want to buy it. Thus passeth individuality and true art.

The other requisite of beauty in a home is that it should express ease, that is to say, it should be manifestly suited to its purpose and should evidence freedom from care for the housekeeper. It should avoid awkward and useless corners, fussy and finniky detail, cumbersome drapery and other senseless features that serve no better purpose than that of gathering dust and affording lodgings for disease germs. The true artist remembers all this and provides a home that brings rest with good cheer to the weary soul.

So when I stepped into the studio of this firm of decorators, I was pleased to see the tasteful simplicity that gave character to the work, and to find that it was this point that secured them the contract—quite a large one too at that—in direct competition with other firms. Here was another triumph of art. It was the most artistic production that was wanted; price cut no figure.

Now let us for a moment follow the result of the award. The first thing shown me was a magnificent rug, an oriental make of rare colors; and I learned that the manufacturers (an East India concern) had capable representatives, who spend three months of every year in traveling about the cities of all countries studying the tastes and demands of the market, then they take this knowledge home to India and produce rugs that bring a large price, and why? Because they are artistic; and as a result, foreign commerce is stimulated—transportation companies prosper, but only after the home people have all enjoyed their share of the good fortune in the many branch industries that are dependent upon the success of the manufacturer.

The same point applies naturally to the furniture, wall paper, goods and everything that was employed in the scheme.

But there will be many to answer that this is not what is commonly meant by the term art. But why not? There is art in everything; and art is the expression of beauty—beauty being perfection. But if such persons are not satisfied with these examples, let us see how the painter and sculptor help in the universal work. We will assume, for the sake of the argument, that most easel paintings are luxuries. But this is a mere relative term and not very definite.

The greatest of modern painters are commissioned at enormous prices to decorate the interiors of our public buildings. This requires the aid of many assistants and gives employment to mechanics and tradesmen of various classes. Sculptors of renown are employed in connection with our buildings and monuments; and their work also calls for the expenditure of large sums of money that are disseminated far and wide.

I have no intention of bardening you with further detailed analyses of cases too numerable for the occasion. But I do want to emphasize the great fact that Art is a living force; that it enters intb, and penetrates the utmost depths of our daily life, and is in touch with our every thought and deed. It is the secret source from which springs all that is high and noble in the human breast, and bears testimony to man's divinity, for it is founded on the laws of proportion in form, and harmony in color—all revealed to us in the great and marvelous works of nature.

The rude savage decks his person with ornaments, and fastens his weapons and implements on lines of beauty. The commonest and most ignorant laborer rejoices in the attractive show bills and is happy if he can but secure some little colored picture to tack upon the cold bare walls of his haunt, and so testifies to the universality of the artistic faculty. Every mother will strain a point to make her child look pretty and dress her in dainty clothes. Whatsoever we buy, which in its nature is intended to have some definite color or form, appeals to our inborn love of the beautiful, and we will choose this article in place of that one, because we think it more artistic. The dry goods merchant, the milliner, the jeweler, the bric-a-brac dealer, the gas fixture man, the one that deals in carpets, hangings, wall papers, furniture, pottery, earthenware, china and glassware, also the florist, the book dealer, and many others, too numerous to mention, that supply our personal wants, all appeal to our artistic faculty.

The same holds true in other lines of trade. Manufacturers of machinery, especially engines, as well as of cars, vehicles, tools and implements, and similar products, pride themselves on the beautiful lines upon which the models are built.

Then too we find a most direct application of art in its purest form to the modern methods of advertising. Fortunes are spent in producing catalogues, which, in many cases, rank high as artistic productions, not only of the designer's genius, but also that of the printer and binder. Our magazines too are filled with evidences of this branch of art, and we have not far to look and we are shown valuable collections of marvelous poster designs, which really call into service the skill of the cleverest artist. Take a peep at our great lithographing establishments, where tons and tons of fine work are turned out to attract the public gaze, with elaborate announcements, all worked after smart water color sketches. There is no end of industries purely mercantile and manufacturing in character that pay tribute to art.

There is still another department which must not be overlooked. When a stranger comes to town, what is it that influences him chiefly? Is he impressed with the people—with our municipal government, or perhaps our police, or our street car system, or our granite and asphalt pavements? Perhaps so! But in all probability, the first question that he will hear would be: How do you like our city? He may be kind, and say it is beautiful, thinking it is really horrid; or he may be frank and say that St. Louis or some other city is away ahead of us, but that there is no place like New York; or if he has ever been abroad, he will say like Paris. There, he will say, is the wonderful Champs Elysees and all the other beautiful avenues radiating from the wonderful Arc de Triomphe—then there is the Place de la Concorde and endless buildings each more beautiful than the other. He will tell you how Baron Hansmann tore down blocks and blocks of old ugly houses to widen the streets, so that the Grand Opera and other palaces could be seen to advantage, and the city beautified, so that all the nations would come to her feet to do her homage. Paris with her architecture that astonishes the world, her parks that are marvels of beauty, her galleries that are perpetual sources of inspiration, and her shops that are the admiration and envy of all; Paris the home and temple of beauty and culture, and Paris with her unbounded wealth, teaches the great lesson of art; teaches that art is sublime, that it lifts up a nation, and that it pays all round, pays handsomely as a business investment. The French, and latterly the Germans too, put an artistic touch to everything, absolutely everything that they produce. Nothing is too mean to be slighted. And if we ourselves would take this lesson home with us and conscientiously strive to cultivate a similar spirit, and couple with it the determination requisite to apply it to our own case, perhaps we too before long might be a Paris, not only so-called, but in fact the real Paris of America.

AMERICAN ARCHITECTURAL LEAGUE.

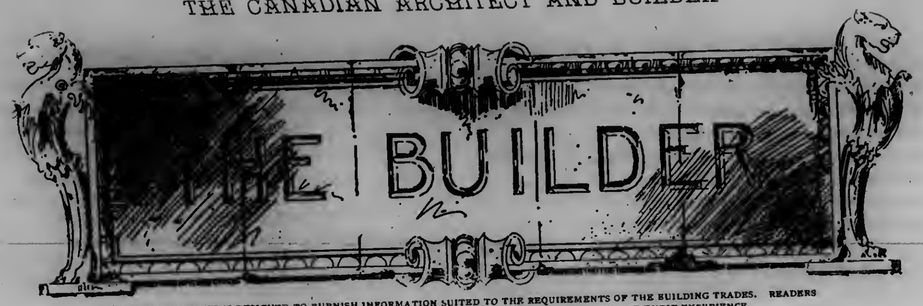
The second annual convention of the Architectural League of America is announced to take place at the Art Institute in Chicago, commencing June 7th. This league is composed of the principal architectural clubs of the United States and Canada, and its object is the promotion of American architecture and allied fine arts. The coming convention promises to be as interesting as any in the past.

The directors of the Hamilton Art School have decided to hold the annual meeting of the school on May 28th.

Mr. A. F. Byers, of Gananoque, Ont., is said to have secured a prize, offered by a firm of bridge builders in Kansas City, for the best design in bridge work.

The Atlantic Granite Company has been organized at Kittery, Maine, for the purpose of acquiring the Atlantic stone quarries at Lower Cove, Cumberland County, N.S. The capital of the company is $100,000, and Mr. George W. Davis, of Cranston, R.I., is president.

The new quarters of the Canadian Society of Civil Engineers have been almost completed. They are located at 859 Dorchester street, Montreal, a private residence having been remodeled by Messrs. Cox & Amos, architects, to meet the requirements of the society. A formal opening will take place some time during the summer.



[THIS DEPARTMENT IS DESIGNED TO FURNISH INFORMATION SUITED TO THE REQUIREMENTS OF THE BUILDING TRADES. READERS ARE INVITED TO ASSIST IN MAKING IT AS HELPFUL AS POSSIBLE BY CONTRIBUTING OF THEIR EXPERIENCE, AND BY ASKING FOR PARTICULAR INFORMATION WHICH THEY MAY AT ANY TIME REQUIRE.]

Some Uses of Portland Cement.

THE uses to which Portland cement can be applied are various and manifold, and a few hints on its uses and application and defects may not be inopportune. When used for foundations in concrete it should be remembered that the best made and best laid concrete will subside and crack unless the bottom be firm and the foundation sound. Upon soft ground where it is necessary to dig down a considerable depth in order to secure a hard bottom for foundations, a great saving of concrete may be effected by forming concrete piers beneath the points of the greatest weight, placed at distances from one another not exceeding eight feet. Concrete lintels should then be placed across the spaces between the tops of the piers. These lintels should have widths equal to the width of the ordinary foundation under footings, the depths varying with the weight to be carried. The insertion of small steel or iron joists within the lintels adds very considerably to their strength. The concrete should be composed of one measure of Portland cement to six measures of ballast. Any settlement of the bottom or any subsidence, contraction or expansion of a concrete foundation must be allowed for. Fine concrete is more liable to contraction or expansion than rough concrete, but is not so liable to subsidence. It will, however, take longer in setting than rough concrete. When laying concrete in a trench it is always best to stretch a line from one end to the other and drive stakes into the ground, allowing them to project sufficiently to permit the concrete to be levelled to them; this will save material and labor. A concrete footing is just as good as brickwork or the best masonry to bring the work up to the surface under ordinary circumstances, but in the case of piers subject to vibration, brickwork is decidedly preferable. Foundations of concrete intended to be covered with paving should never be less than six inches thick. For concrete walls the mixture should consist of two parts of sand, three parts of ballast which has passed through a round mesh 1½ inches in diameter, and one part of Portland cement. When concrete is placed on a timber frame the latter should be made strong and rigid to prevent sagging. If the wall is to have an external face, the boarding used as molds must be planed smooth, but if the wall is to be afterwards rendered this provision may not be necessary. Courses of concrete should not be laid less than six inches or more than 12 inches at a time, the upper surface of each course being left rough to form a key for the succeeding course. A 12 inch concrete wall is of equal strength to a 1½ brick wall, though some municipal regulations require the concrete wall to be of the same thickness as the wall above. A concrete wall will conduct sound readily. Where concrete covers timber the latter should be well welted before being covered with the mass.

Concrete Roofs.

When a good base is provided, there are few roofs that can be made more effective and durable than a good concrete one, finished off with a layer of fine Portland cement and sand, though care must be taken when the concrete is first laid that the sun's rays be kept off the work for several days; indeed, the whole work should be kept damp and as cool as possible for a time, and this can well be done by covering it two or three inches deep with sand and wetting the sand from time to time with water from a spray hose or from an ordinary watering can. Cracks in concrete roofs are frequently caused by the settling of the buildings, either from natural shrinkage or from defects in the foundation. When cracks do appear, they should be filled with a fine mixture of Portland cement and sand. To counteract the expansion in roofs of this kind, compressible linings of wood strips should be used around the works where the flashings are usually placed, and a cement skirting or flashing 6 inches high and 1 inch thick should be well keyed into the walls with all concrete roofs, and this can well be done by raking out the mortar joints of the brickwork that is to be covered and wetting the whole before the cement is applied. No other flashing will be required. Where a concrete roof is laid on between the rafters, the timber work should be made strong, and there should be ample wood fillets well nailed to the lower edge of the rafters to hold the cross boarding on which the concrete is laid. When desired, slates or tiles may be either nailed to the concrete or bedded into it while yet in a damp state. The pitch most suitable for a concrete roof is about ⅜ of an inch to the foot. This is ample to carry off the water and not too much to effect the cement while being laid. Once a concrete roof is properly finished and all settling ceased the roof becomes almost everlasting, or at least it will last as long as the base on which it is constructed.

Concrete Floors, Ceilings, Stairs, Etc.

CONCRETE floors may be laid in one mass, or may be laid in sections; or a first layer of coarse concrete may be laid down and a finishing layer in sections put on the top. Square slabs of concrete are much stronger than oblong ones. Slab floors being homogeneous throughout, the whole weight is a dead weight, and consequently there is no thrust on the walls. Joist concrete floors do not require much skilled labor in laying. The concrete is laid between, over and under the iron joists, which are fixed from 3 feet to 5 feet apart, according to

the span and strength of the joists. Tiles or fine finish in cement may complete the surface, according to the quality of the work desired. A combined floor and panelled ceiling may also be formed in concrete, with the surface finished in fibrous concrete or cement. Damp or dry rot is an objection to concrete floors finished with flooring boards, and special care should be taken to prevent this. A good way to avoid this is to lay felt or mineral wool on the concrete from one half to one inch thick, before the boards are laid ; this will also act as a non-conductor of sound. Greater lightness may be obtained in concrete floors by the use of concrete tubes. Half-circle pipes laid on their side edges may be used to save concrete and prevent over-loading the floors. If underneath the joists is to be finished in plaster, some provision must be made for holding the necessary metal lath. If homogeneity in a floor is required without flaws or cracks, the floor must be completed at one operation and without cessation, or flaws will surely follow. In forming concrete steps or stairs, the foundation or base should be made good and strong, and iron pipes or T pieces may be placed in the concrete at suitable points to give strength to the steps or the strings. They also help to carry the dead weight until the mass is thoroughly set, and also prevent risk of sudden defection. When enriched finish is desired, fibrous plaster is well adapted for concrete surfaces. The soffits and strings by this method can be panelled or enriched with medallions or foliage as required. The operations necessary in the construction of concrete stairs are : (1) Setting out the stairs and landings ; (2) preparing the wood skeletons and fixing it in place; (3) gauging the materials and filling in ; (4) removing the framing when the work has set ; (5) cleaning up and finishing treads, risers and strings ; (6) striking the soffit and centering and finishing the soffits ; (7) protecting and wetting the work until it is set and hard. Sometimes stairs are built with the steps cast separately and then built in, in the same manner as in stone. Stairs should be built spacious, light, and easy of ascent. A 12-inch tread and a 5½-inch rise make a most convenient and comfortable stair to mount. No tread should be less than 8 inches or more than 16 inches wide, and no rise less than 4½ or more than 7 inches in height. In order to obviate slippery steps, the surface should be indented with a concrete roller, or three or four sunk V-shaped grooves from 1 to 2 inches apart should be made in the treads while the concrete is moist. To make the nosings and mitres sharp and true on the ends of the treads, and set the soffits of the stairs and landings properly, and form a true arris at the stringing, the plasterer's skill and training is indispensable ; without it the work will be uneven, rough and unworkmanlike. In the handling of Portland cements, in any form. it pays best to employ skilled labor. Results are always more satisfactory, and these are achieved with a minimum of material.

A local company has been formed, under the name of the Union Mining Company, for the purpose of engaging in the manufacture of cement at Miami, Man. It is said that satisfactory tests of the material in the district have been made by several experts.

The bricklayers in Vancouver, B.C., struck for an eight hour day on April 1st. The employers agreed to give an eight hour day conditionally, but the men refused to accept the conditions. A few days later the stone-cutters struck in sympathy with the bricklayers. The wages of painters in the same city has been advanced to $3 per day.

CODE OF RULES FOR TENDERING.

Following is a code of rules regulating the practice of estimating and contracting recently adopted by the Vancouver Builders' Exchange, to which reference is made elsewhere in this paper :

On and after April 10th, 1900, unless special permission is given by the Exchange, its members shall not tender or contract for work unless the following conditions are complied with :

1. Tenders may be submitted separately for the work in the different trades, or in bulk, but not for both. When whole and separate tenders are asked for the same work no bids shall be given.

DRAWINGS.

2. Drawings prepared for final or competitive estimates must be sufficient in number and character to represent the proposed work clearly, and shall be to a scale of not less than one-eighth of an inch to the foot (except block plans), and be rendered in ink, or some permanent process, and be either coloured, figured or otherwise marked in such a manner as to clearly show all kinds of material to be used, thickness of walls, grades and position and depth of city drains and sewers.

SPECIFICATION.

3. Specifications must be printed, written or typewritten in ink. They shall definitely describe work not clearly shown by drawings. Every distinctive class of work to be included in the contract must be mentioned and placed under its appropriate heading, as indicated by Outline for Specification attached.

NOTICE FOR OPENING BIDS.

4. Before opening bids, the bidders shall be notified of the time when, and the place where the bids will be opened, and they shall be opened in the presence of the attending bidders. If so required by an architect, when calling for them, tenders must be accompanied by a marked cheque equal to 5 per cent. of the amount of tender, cheques to be returned when bids are opened, excepting the lowest three ; these to be returned when contract is let.

PERCENTAGE ON SUB-CONTRACTS.

5. Contractors shall be allowed a compensation of five per cent. on all sub-contracts which at the time of estimating are "reserved" or not called for, but which may be assumed by them by request of the owner of architect, after building contract is let.

AWARD.

6. When work is to be let for which estimates have been solicited, the lowest invited bidder shall be entitled to the contract, and all changes amounting to less than 20 per cent. of the amount of his tender shall be agreed upon with him, provided his prices are equitable and his references prove suitable. Should the prices for changes made by the lowest bidder not be deemed equitable, they shall be settled by arbitrators, one of whom shall be appointed by the owner and the other by the bidder, the arbitrators to appoint a third if necessary, and the majority decision shall be final.

If changes are made amounting to 20% of the amount of the tender the whole competition may be re-opened.

Bidders must not be allowed to amend their estimates after the bids have been opened and before the award.

7. Bids shall be binding upon the bidders or owners for not more than ten days.

8. No payments on contracts shall be less than 80% of the value of the work done, and 50% the value of materials delivered and accepted by the architect ; the remaining 20% to be paid within thirty-three (33) days after the completion of the contract.

Sureties will be furnished by the contractors if so required by the owner ; and in such case the payments shall be 90% of the value the work done.

Tests were recently made by the city authorities at Vancouver, B. C., of samples of foreign and local cement. The results are reported to have proven that the local production was equal in quality to the imported cement.

Mr. Joseph Bourque, contractor, of Hull, is reported to have entered an action against the Catholic Corporation of Ottawa to recover the sum of $4,200 which he claims is due him for extra work performed on St. Patrick's church. The church authorities, it is stated, ask indemnity for the work not being completed in the specified time.

SOME HINTS IN READING PLANS.

WHAT I may say in this article will perhaps seem trite and commonplace to those readers who are accustomed to go every day into architects' offices and there carefully measure the drawings set before them in order to submit their estimates, for I have no special hints to give them nor short cut methods to suggest, but I know by experience that there are many young painters to whom a set of plans is a mystery which they cannot comprehend, and it is for their benefit that I am writing.

Now let us start out with the explanation that working drawings are not pictures of the object they are intended to delineate, but they are a conventional means of representing an object so that its different dimensions may be obtained by scale measurement, and so that the mechanic who understands the principles of working drawings may be enabled to construct the object represented. A working drawing is, geometrically speaking, a projection of the object represented upon a plain surface. At least two drawings are absolutely necessary in order to represent any object—a plan and an elevation, and to make a full set of working drawings usually four elevations are required and one or more plans, while in addition sectional drawings showing the object represented as being cut through are made to further illustrate points that require explanation. As a rule the painter will be interested only in such working drawings as come to him from the architect's offices, and these usually consist of the floor plans and elevations of the houses on which he is asked to bid. He is seldom shown the larger details, though these might materially modify his estimate.

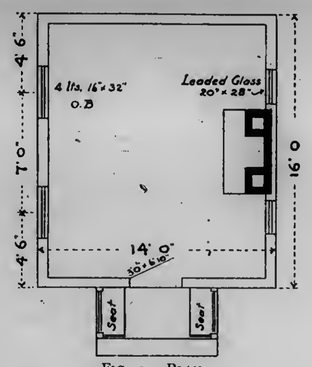


FIG. 1.—PLAN.

With these preliminary explanations, let us start at once to consider a set of working drawings ; and for the purpose I have selected the drawings of a small one story frame office building such as the village painter might be called upon to submit an estimate upon ; just such a building as might be erected for the lawyer or doctor ; plain and neat, and with no architectural pretensions.

First, let us examine the plan. (Figure 1.) A floor plan is the easiest of all working drawings to understand, for it is a conventional diagram, representing the building as it would appear were it cut through by a plane parallel with the ground at a point somewhat above the level of the window sills, so that all the window and door openings are indicated upon the plan. The observer is supposed to be looking down from above, and the drawing is made to scale the same as a map. In short, a floor plan is merely a map of the particular floor of the house which it is intended to represent, and as my readers have all studied geography we may at once proceed with the special points requiring consideration in estimating from plans, and the conventional signs that are used to indicate certain things upon a floor plan. In former days the architects made their plans upon tracing linen, and the sections of the walls that appeared upon the plans were colored yellow to indicate wood, red to show brick or blue to denote stone, but nowadays mechanics seldom see a tracing, but blue prints, made by a photographic process, are used instead. The use of colors has been practically abandoned and plans are drawn in simple lines just as shown by the figure, though in some offices the sections of the walls are cross hatched, or section lined. Brickwork is painted in solid. I have shown the chimney in solid black. On the blue print it would appear solid white.

Every change in level is represented by a line. For this reason two parallel lines are employed to show the walls and partitions, broken only at the doors. In this particular plan a line at the lower side of the door indicates the step leading down to the stoop of front porch. The door itself is indicated by a diagonal line to show on which side it is hung—though this is often omitted—and the size of the door is shown by figures. The windows are indicated by parallel lines running between short cross lines. This only gives the width of each window ; the style and general dimensions we must gather from the elevations. But as windows are a very important thing for painters to consider, you must carefully count the windows on the plan and then just as carefully locate them on the elevations, checking up one by the other. Some architects figure the glass sizes on the plans, and also mark whether outside or inside blinds are to be used. Others put this information on the elevations. Still others do not figure the glass sizes on the general drawings, but leave them

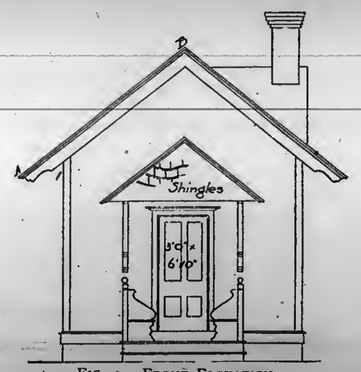


FIG. 2.—FRONT ELEVATION.

to be determined by the detail drawings that are furnished after the contract has been let. In this case it is well to scale the width of the window on the plan as closely as possible and deduct four inches for the stiles of the sash, dividing the remaining number of inches by the number of lights of glass to get the average with. But in doing this it is well to carefully compare the results thus obtained with the elevations, since a careless draughtsman may have made the windows on the plan narrower than they should be.

Now let us look at the question of measurements.

Working drawings are always drawn to scale. The usual scale for general drawings is either one-quarter or one-eighth of an inch to the foot. That is, a quarter or an eighth of an inch on the drawing will represent a foot on the actual building. These scales are spoken of as "quarter scale" and "eighth scale." In the first; every quarter inch on your two foot rule, as you lay it upon the plan, will represent a foot on the building, every eighth inch six inches, and every sixteenth will

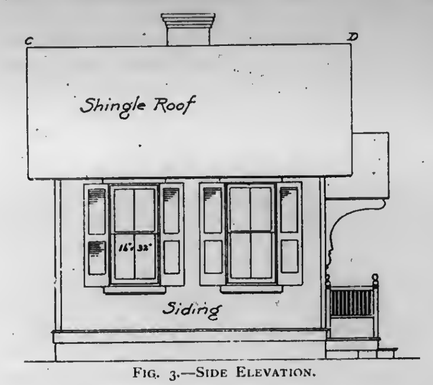


FIG. 3.—SIDE ELEVATION.

represent three inches. On an eighth scale drawing you cannot scale closer with a two foot rule than six inches, which is represented by a sixteenth of an inch. Occasionally sketches are made to a scale of a sixteenth of an inch to the foot, but except for approximate figures the mechanic should refuse to estimate from a drawing on this scale, as it is impossible to make such a drawing sufficiently accurate to permit of anything but guesswork. In general, a quarter of an inch to the foot is small enough for accuracy, except in the case of large buildings, though some architects are so particular in making their working drawings that an eighth scale

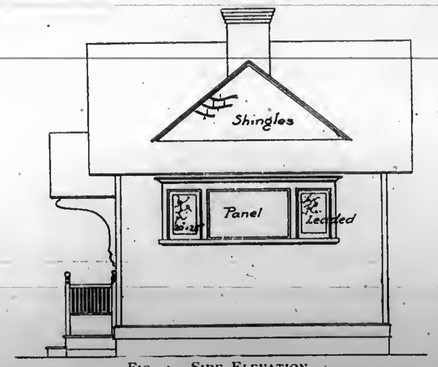


FIG. 4.—SIDE ELEVATION.

drawing from that office is more apt to scale correctly than a quarter scale from another office where the draughtsman is notoriously careless as to accuracy. These, however, are points that you will soon learn after a little experience in figuring out of different offices. On the plan all measurements are considered as being made on floor or parallel with it. The accompanying drawings have been originally made to a quarter scale and photographically reduced to an eighth scale.

In order to insure accuracy in laying out the building the architect does not depend entirely on scale measurements, but carefully figures the dimensions on his drawings, though this is not always done until after the contract has been let. These figures are placed either in rows across the plans, with arrow points to indicate the places between which these measurements are to be counted, or they are placed outside, with dotted or red lines running to the point indicated by the figures. At the bottom of Figure 1 you will find a general cross dimension, to the right and outside is the total length and on the left side is a dimension line indicating the centers of the windows. The rule in all architects' offices is that figured dimensions are always to be taken in preference to scale measurement, and this is a very important rule to consider in estimating. I have seen mechanics figuring on a set of drawings entirely by the measurements which they would read from their two foot rule, neglecting plainly figured dimensions. When you consider that often there is considerable discrepancy between the two (the figures being placed on the drawing after it is entirely finished, and then being carefully calculated to correct any error the draughtsman may have made), the danger of this practice is readily seen.

Now turning to the elevations, we see that the sloping roof, of which only the edges are seen in the front elevation (Figure 1), becomes a rectangle in the side elevations (Figure 3 and 4). If this is to be painted it becomes an important question to determine the number of square feet in this roof. To do so we measure from eaves to peak on the front elevation (A to B) and multiply by the length of the ridge line on Figure 3 (C to D). To obtain the number of square feet on the different perpendicular surfaces on each side elevation is merely a simple question of mensuration as given in the arithmetics. But to determine the area of any sloping surface we must first examine the drawings carefully to find its greatest length and greatest breadth, just as we have done in the case of the roof. Study carefully, in this manner, the method of determining the surface of the projecting hood, carried on brackets, shown only by two parallel lines on the front elevation, which extends over the front stoop.

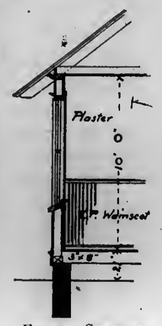


FIG. 5.—SECTION.

In the sectional drawing (Figure 5), which represents a piece cut through the building, we can scale the unde surface of the eaves, which the specifications tell us are yellow pine match boards that are to be oiled and varnished. We can also see the height of the wainscot that is to have three coats of varnish, and the quantity of rough plaster which is to be kalsomined.

In a brief article like this it is impossible to discuss every point that may be brought up in reading a set of plans, but the painter who carefully studies those plans which may come to hand by the same methods we have here employed, and who is guided in his measurements by the system of measurements adopted by the National Association of Master House Painters and Decorators, and published by them in book form, need fear no difficulties that may present themselves.—James K. Carpenter, in Painters' Magazine.

The journeymen plumbers of Halifax, N.S., went on strike on May 1st for an increase of wages to $2.25 per day.

FOUNDATIONS OF BUILDINGS.*

By S. ANGLIN, Master of Engineering, Royal University of Ireland.

IN recent years the field of operations of the architect has been considerably enlarged by the introduction of steel and iron in the construction of buildings, and what was formerly considered to be exclusively the business of the civil engineer is becoming more the work of the architect. A knowledge, therefore, of the nature and properties of steel and iron and the methods of calculating the strengths of the various members of such structures is becoming more essential every day to the architect. It is not proposed in this paper to deal with the arranging and designing of such structures—this of itself would supply material for more than one paper—but rather to make a few remarks on the supertructure or foundations of such buildings, and, indeed, of buildings in general.

In ordinary buildings constructed of stone or brick walls, the pressure on the foundations is pretty evenly distributed over a comparatively large area of ground surface; so that pressure per square foot on the foundations is usually small, and does not call for any special consideration except when the ground is soft or treacherous. In the case of lofty buildings of enormous weight supported on pillars the case, however, is quite different. In such buildings as much as 1,000 tons may come on the foundations of a single pillar; this immense pressure being exerted on a comparatively small area of ground surface, it will be apparent that special means will have to be adopted for insuring the stability of such foundations.

My attention was forcibly drawn to the importance of this subject, and to the scant thought it sometimes receives by the architect, about four year ago, when I was asked to report on the causes of the collapse of a large mill then in course of construction in Germany. This was a typical Lancashire cotton mill, of several stories, the floors being for the most part supported on cast-iron pillars. These pillars rested on brick piers, underneath which were beds of concrete, the concrete itself resting on a sand foundation. Partly owing to the presence of water in the sand, partly owing to inferior bricks and mortar and the slovenly manner in which the work was executed, and perhaps, also, partly owing to to the defective cast-iron base plates on which the pillars rested, one day, when the construction of the mill was nearing completion, the foundations of one or more of the pillars subsided, causing the base plates to fracture, and the shafts of the pillars to pierce through the brickwork and concrete beneath. This occasioned the complete wreck of the structure, and entailed the loss of the lives of several of the workmen. Here we have an example of a building carefully designed and erected so far as its superstructure was concerned, but, owing to caretessness in the designing and execution of the foundations, meeting with an untimely fate.

In America the construction of lofty steel and iron buildings is carried to much greater lengths than in this country. The erection of what are termed "sky scrapers" seems to have originated in Chicago, and from there has spread to several other cities in the States, and it is not at all improbable that in the near future we shall see their introduction into England.

There may be many objections to these colossal structures from an æsthetic point of view, and I dare say many people consider them monstrous eyesores. There may be also objections to them as excluding light and air; yet, when we admit all this, we cannot but admire the ingenuity displayed in their construction, and from a commercial point of view we must admit their claims, especially in cities where land is very valuable. Such being the case, we should face the situation boldly, and, instead of decrying them as monstrosities, should rather study them and make ourselves conversant with all the intricacies of their design.

In America, the work of designing these structures is usually divided between the engineer and architect. The details of their construction are so varied that neither the engineer nor the architect by himself can satisfactorily cope with them. The work of the engineer consists in designing the steel framework, including the pillars and girders; that of the architect in arranging the plan of the rooms and offices and the skeleton walls and partitions, and also the general decorations; while the foundations, which are of the utmost importance, might be planned conjointly by both. In providing for these, the loads coming on the foundations must first be carefully calculated. These consist of, first, the dead weight of the building itself, including that of the floors and roof; and, secondly, the loads on the floors, which may consist of goods, machinery, and people, and also the wind pressure exerted on the building. These latter loads may change from time to time, and are sometimes termed live or accidental loads, and they vary considerably in different buildings.

The maximum live loads on the floors of dwellings may be taken as 1¼ cwt. per square foot; on public buildings at 1½ cwt. per square foot; and on warehouses at from 1½ to 3 cwt. cwt. per square foot. In the case of dwelling-houses and public buildings it scarcely seems probable that these loads can be reached, but it is always advisable to have a margin. It is quite possible that such floors may contain a densely-packed crowd of people, which may weigh as much as 1 cwt. per square foot of floor surface. In the case of lofty structures consisting mainly of offices with light fixed furniture it is not necessary to allow for such heavy loads as those specified. The weight of the rouf, including wind pressure and snow, depends on the span, and varies between 25 and 65 lbs. per square foot of roof surface.

A lofty steel structure has just been completed in New York, and it may be of interest to refer to a few particulars respecting it.

This is the Park Row building, mainly consisting of offices. It is the highest building in the world, its height from the level of the kerb in Park Row to the top of the cupola being 386 feet. It has thirty-two stories, and contains 1,000 offices, having accommodation for 4,000 persons. The total weight of the building is estimated at 65,000 tons, and the pressure on some of the pillar foundations is as much as 1,100 tons.

The structure is carried on round timber piles of spruce from 10 to 14 inches in diameter, driven into a sand foundation to a depth of about 20 feet. The piles are placed from 16 to 18 inches apart, centre to centre, and are driven in rows, the distance between each row being 24 inches—centres. The load on each pile does not exceed 16 tons. The heads of the piles were cut off level, and concrete was filled in between them to a depth of 12 to 16 inches, the surface of the concrete being level with the tops of the piles. Upon the concrete are laid granite blocks which receive brick piers, which in their turn receive the grillage beams and distributing girders. Some of the interior pillars rest directly on the grillage beams, which are steel-rolled joists. In other cases distributing girders rest on the grillage beams of two or more of the foundations, and support two or three pillars. These distributing girders are massive steel-riveted girders of the box form, and vary in length from 20 to 47 feet, and in depth from 6 to 8 feet, and some of them weigh as much as 47 tons.

This example of a building is, ot course, an extreme case, and the architect may never be called upon to consider such enormous loads and such intricate foundations; yet the general principles coming into operation here are, in a modified way, applicable to similar buildings of less pretentions.

Having said so much in a general way, we will now consider more in detail as to what constitutes a good foundation, and what working loads different foundations are capable of sustaining. I would, however, remark that within the scope of a brief paper, hastily written, it is not claimed that anything in the nature of a complete survey of the question can be attempted.

In preparing a foundation the first thing to be done is to examine the nature of the ground on which the building is to be erected. It is not often that the surface of the ground is suitable for building upon. If it is of rock, of course we have all that is necessary so far as the stability is concerned. It is the exception, and not the rule, however, that a rocky foundation is to be met with. It then becomes necessary to excavate until a reliable foundation is reached. As to what constitutes a reliable substratum is a matter very largely the result of practical experience.

Ordinary foundations may be ranged under three classes, viz:

1. Foundations in rock, or in some material whose stability is not affected by water.
2. Foundations in firm earth under which are included such materials as sand, gravel, and hard clay.
3. Foundations in soft earth.

It must be borne in mind that the base of every foundation should be as nearly as possible perpendicular to the direction of the pressure which it has to sustain; and moreover, it must be of sufficient area to bear that pressure with safety.

To prepare a rock foundation for being built upon it will be necessary:—(1) To cut away all loose and decayed parts of the rock; (2) to cut and dress the rock to a plane surface, or to a set of plane surfaces like those of steps, perpendicular to the direction of the pressure; (3) to fill, where necessary, hollows in the rock with concrete or rubble masonry; or it may be advisable, in order to distribute the pressure, to cover the surface of the rock with a layer of concrete varying in thickness from a few inches to several feet.

The crushing strength of rock varies considerably. That of chalk, if we may consider chalk a rock, is as low as 30 tons per square foot. The crushing strengths of different kinds of sand-

* A paper read before the Manchester Society of Architects, and reprinted from the Journal of the R.I.B.A.

stone vary between 140 and 450 tons per square foot, that of limestone about 500 tons per square foot, while that of granite or basalt is as high as 1,000 tons per square foot.

The intensity of the working pressure on a rock foundation should in no case exceed one-tenth of the pressure which would crush it. It is not often in practice, however, that the actual pressure on a rock, or indeed any foundation, approaches this limit. Speaking generally, the average pressure coming on a fairly good quality of rock is about 10 tons per square foot in work which has been executed ; and the architect might fix in his mind anything up to 20 tons as a safe rule to go upon. On weak sandstone, which is so soft that it crumbles in the hand, 2 tons is sufficient to allow.

Having said so much on rock foundations I will pass on to the consideration of foundations laid on firm earth, under which head may be included hard clay, clean dry gravel, and clean sharp sand. For buildings resting on such foundations, it is desirable, in this country, that the foundations should be carried at least 3 feet below the surface of the ground for sand or gravel, and 4 feet for clay, in order that they may not be weakened by the disintegrating effects of frosts or other climatic conditions. In other countries where greater extremes of climate are experienced a greater depth is necessary. The practice in Germany, for example, I understand, is that for foundations of this kind the depth should be from 4 to 5 feet, and in North America from 4 to 6 feet.

It is very desirable that surface water should be kept from such foundations by constructing suitable drains.

Different authorities vary very much in their estimates as to what working pressure it is desirable to place on this class of foundations. The German authorities recognize 2.5 tons per square foot as a suitable pressure. With good clay, however, sufficiently beneath the surface of the ground to be protected from atmospheric influences, much higher pressures can be safely applied. The main piers of the Tower Bridge in London rest on clay, on which they exert a pressure of 4 tons per square foot. At Openshaw, near Manchester, the massive steel pillars of Messrs. Sir W. G. Armstrong, Whitworth & Co.'s works, which are subject to vibratory loads from passing cranes, exert in some cases a pressure of as much as 5 tons per square foot on the clay, and no settlement has been observed. In other buildings, no doubt, greater pressures exist ; but this is the limit so far as my experience goes. In the great majority of structures built on clay the pressure is much less. That of the Nelson Column, in Trafalgar Square, London, does not exceed 1.3 ton per square foot. This column rests on clay of great depth and compactness. In preparing this foundation an excavation of 60 feet square and 12 feet deep was made and filled up with concrete to a depth of 6 feet ; on this base a frustum of a pyramid 13 feet high was built in brickwork, on which the superstructure was erected. On a base 60 feet square, which may be taken as the real base of active support, the gross load amounts to 4,665 tons, equivalent to 1.3 tons per square foot, as already stated. I think I may say that three times this load could with safety be placed on this foundation.

Foundations in gravel and sand, under favorable circumstances, are capable of bearing heavy loads. The Campanile of Cremona, 395 feet high, standing on Pliocene gravel, bears with a pressure of 12 tons per square foot on its base.

It is not often that water is injurious to a gravel foundation, as it can percolate through freely ; but with sand the case is quite different, as water so alters this material as to make it quite useless for a foundation. The obvious tendency of sand saturated with water is to escape laterally under pressure. If this tendency can be counteracted by any means it may be possible, though not desirable, to utilise a foundation of this description. Sheet piling driven around the foundation often answers the purpose. A case in point is supplied by the tower of Hamburg waterworks. This tower rises about 290 feet above the surface of the ground ; it is built of brickwork, and rests on a circular block of concrete 56 feet in diameter and 11 feet thick. This in its turn rests on quicksand enclosed by sheet piling driven below the line of saturation of the river Elb. The gross weight supported amounts to 5,310 tons, which gives a pressure of about 2 tons per square foot on the quicksand.

A foundation of unequal density or compressibility is one to be avoided. When of equal compressibility any subsidence which takes place is uniform all over the foundation, and the structure erected on it is not materially damaged ; but if one part of the foundation is more compressible than another, the structure has a tendency to be tilted out of the perpendicular, and cross-stresses are produced which may destroy its stability. In north Italy, as is well known, a number of leaning towers erected as far back as the twelfth and thirteenth centuries exist, and the reason assigned in the majority of cases for these being out of the perpendicular is the unequal compressibility of the foundations on which they are erected. A noted example occurs in the Campanile or leaning tower of Pisa. This is a circular tower 178 feet high, weighing 11,800 tons, with a base 60 feet in diameter, which is equivalent to a pressure of more than 4 tons per square foot. The soil under the foundation is of unequal density, it being more compressible in the direction in which the tower leans. That the settlement took place during the progress of the work may be inferred from the presence of iron bars introduced to hold the building together.

When foundations are too soft for building upon, and when the depth is too great for excavating to a reliable material, special means must be adopted. One method is that to which I have referred in the tower of the Hamburg waterworks. Another method is to consolidate the ground by timber piles, which was the method adopted in the Park Row building at New York. These bearing piles act as pillars, each supporting its own weight of the building. They may either be driven through the soft stratum until they reach a firm stratum underneath and penetrate a short distance into it, or, if that be impracticable owing to the great depth of the soft stratum, they may be supported wholly by friction in the soft stratum. From practical examples, the safe working loads on these piles may be taken as follows :—

For piles driving until they reach the firm ground, 1,000 lb. per square inch of the area of the pile may be allowed.

For piles standing in soft ground, and supported wholly by friction, 200 lb. per square inch of pile section is sufficient.

The best material is elm. The point of the pile should be fitted with an iron shoe, especially if stones or other impediments are to be met with, and the head should have an iron band to prevent its being split by the blows of the ram. They may be driven by hand or steam power. For the piers of bridges and similar structures iron screw piles or cylinders may be used.

In ordinary steel or iron structures, the main pillars usually rest on concrete, brickwork, or stone, and some times on all three in combination. When laid in combination, a concrete block is first laid, upon which several courses of brickwork may be built, and lastly a stone slab placed on the top. It is not often, however, that all three materials are used together, one or two generally being found sufficient. The intensity of pressure on the ground underneath may be modified to the required extent by increasing the area of the concrete block, or by stepping out to the necessary extent the lower courses of brickwork.

It is of great importance that the architect should be conversant with the working loads allowable on these materials.

The working pressure allowed on concrete foundations of sufficient thickness varies considerably according to the quality and age of the concrete. Generally speaking, it may be taken as varying between 2 and 10 tons per square foot. It is not often, however, in work that has been executed that so high a pressure as the maximum mentioned exists, from 1 to 5 tons being most general. When pressures of 5 tons and upwards are to be provided for, great care should be bestowed on the manufacture of the concrete. All the materials composing it should be of good quality. All earthy substance, ashes, soft broken bricks or greasy matter should be excluded ; round smooth gravel or stone should be broken. The best Portland cement should be used ; it ought to have a cohesive strength of 400 lb. per square inch after seven days from mixing. The proportions of the different ingredients should be four parts of broken hard brick or stone, one of clean sand, and one of cement. The concrete should be turned over twice dry, and three times wet, and well rammed in 12-inch layers. It is not advisable to send the concrete down a shoot or drop it from a height, unless it is afterwards remixed, as the larger pieces fall to the ground first, the smaller pieces next, and last of all the cement. Whenever used under water, the water should be still ; a current will carry away the cement and leave only the ballast.

The crushing strength of bricks varies considerably. It may be as low as 60 lb. per square inch, and as high as 1,700 lb. per square inch. Best blue bricks show a strength of 1,200 lb., while Stourbridge fine bricks will stand 1,700 lb., or even more. When great pressures have to be borne, the latter, or others similar in strength, should be used. It is desirable in a brick foundation that not only should the quality of the bricks be good, but also that they should be properly laid in good cement. Each course as laid should be well rammed down and bedded, leaving the layer of cement between each course as thin as possible. When this is done it is extraordinary what a brick foundation will support.

In connection with the failure of the foundations of the German mill already referred to, I had some experiments made as to what loads a brick pier was capable of sustaining. The test was made on a block of good red brickwork, 3 feet 1 inch by 2 feet 11 inches, and 1 foot 4 inches thick. It was built of five courses bedded in cement, the bricks being pressed close together, with a thin layer of cement between them, and allowed to set for ten days before the test was made. The bricks were made by Messrs. Smehurst, of Oldham (and some of similar quality were tested by Mr. D. Kirkalday, who found that it took a pressure equal to 480 tons per square foot to crush them). The pier composed of these bricks was inserted between iron plates and placed in a hydraulic press, the area of pressure on the brickwork being 5.3 square feet. Pressure was gradually applied until it reached 622 tons, which is equivalent to about 117 tons per square foot. The pressure was not increased beyond this point, as the press was incapable of anything greater. After the brickwork was removed and examined it exhibited no signs of failure, and was apparently as perfect as it was before the test.

According to the Berlin building regulations, with ordinary brickwork set in lime mortar a load of 7 tons per square foot is allowable for a working pressure, while with good hard bricks laid in cement 11 tons per square foot is recognized. Generally speaking, in this country anything between 2 and 10 tons per square foot is the practice.

With iron or steel pillars resting on stone, brick or concrete foundations, there is another very important matter, frequently lost sight of, which should receive careful attention, and that is the proper bedding of the base of the pillar. When it rests on a block of stone, the stone should be carefully dressed off to a level surface, and the bottom surface of the base of the pillar should also be true. Some engineers insist upon having the latter machined. Even with these precautions, in very important work a layer of sheet lead might be introduced between the two surfaces. I remember several years ago when the present Manchester Guardian newspaper offices were being built, a failure arising from improper bedding occurred. The main cast iron pillars supporting this building sustain very great loads. One day it was discovered that one of the cast iron base plates was fractured, and also that the stone on which it rested was cracked. This occasioned a good deal of alarm for the safety of the building and a celebrated London engineer was called in to report on the matter. He discovered that it arose from imperfect bedding. The top of the stone, instead of being tooled to a level surface, was hollow towards the centre, and the whole pressure was transmitted to two or three points towards the edges, which sufficiently accounted for the failure.

With concrete and brickwork foundations a good plan, when it can be adopted, is to bed the base in cement. This often can be done with a loose base, but in the case of steel pillars, where the base is an integral part of the pillar itself, it cannot be satisfactorily adopted. The modus operandi in such cases is to leave the surface of the foundation rough, and place the pillar upon it with iron wedges inserted at the four corners. By means of these wedges the pillar can be raised to the right level and made plumb. When this is done liquid cement should be carefully run underneath. This effectually fills up all inequalities and evenly distributes the pressure over the foundation. The cement should be of such a nature as to set hard, and may vary in thickness from ¼ inch to 1 inch.

THE PRISM QUESTION.

The story of Luxfer Prisms and their development from the first suggestion as contained in the crude Pennycuick patent, is an interesting chapter in the history of building materials. The large sums of money spent on this device, and its ultimate commercial success, has tempted a great many to imitate the scheme by copying one or more of the numerous refracting angles used by the Luxfer system, making some slight alterations, such as a nick in the top of the prism or a spot in the centre. These imitations have been put on the market from time to time, each having a fancy name indicative of their great light-producing qualities.

It is generally known that the Luxfer device is protected by a series of patents, so that users of imitation devices, when considering the cut prices quoted, will do well to ponder how far they can afford to take chances of a patent suit. So far, we are informed, architects have had no trouble in showing their clients that in Luxfers they get better value for the money expended than from any device yet produced, and, even if some one was daring enough to make an exact copy of the series of angles used by the Luxfer Company so as to give substantially same results, it is doubtful whether the architects would advise their clients to be a party to a patent dispute for the sake of a possible small margin in cost. It cannot be conceived that the Luxfer Company would, after spending so much money on their patent situation, allow any infringer to get a material hold on the market. So far the imitations that have been brought out have, after one or two insignificant installations, dropped out of sight. This will probably be the case with each succeeding attempt, but if it ever becomes possible for an imitation device to get any hold on the market, a lively time may be anticipated by the purchasers thereof, as the Luxfer Company will doubtless, if they consult their interests, take action against the user, who can always be got at, rather than the seller, who is generally an agent for some American company capable of being dissolved as quickly as it was created.

Not only is the building trade indebted to the Luxfer Prism Company, Limited, for the production of Luxfer Prisms, but this company has arranged to put on the Canadian market all the better lines of building materials, such as architectural terra cotta, hydraulic-press brick, marble mosiacs, mycenian marble, ornamental iron and art glass. The showrooms of the company at 100 King street west are a veritable exhibition, where architects and others interested in the building trades will find a large number of interesting things.

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MARBLE.*

IN architecture the word marble conveys the idea of a stone of more importance than an ordinary building material. It is a stone always possessed of some special beauty, either in texture, color, or both, and of sufficient hardness to take a polish. The varieties are almost infinite, and numerous as they are, it is rare that any two quarries are precisely the same; there is always an individuality of some sort or other.

We have marbles of one uniform color, as white, black, gray, red, yellow, green, and so on; but in all cases, even in whites and blacks, there are differences. The whites of Carrara, Italy, differ from those of Greece, Spain, and America. The blacks of Belgium are not the same as those of England and Ireland. The serpentines of the Lizard, Cornwall, differ from those of Banff, in Scotland, and Anglesea, and further vary from those of the Continent and America. These variations are not to be wondered at, when for a moment we study their origin and the different changes they have gone through as part of the earth's crust. Their ages are equally wide, some being, comparatively speaking, recent, while others are old, and some very old. The white crystalline marbles are now conclusively proved to be nothing more than ordinary sedimentary limestone rocks, like our chalk cliffs, or carboniferous rocks, which have gone through a process of cooking or baking under great pressure, while being hermetically sealed by overlaying rocks which have kept in the gases, causing the limestone rock to crystallize and alter its nature to that extent that rarely any of the fossils are now discernible; in short, a new rock is produced. There are other whites that have been produced by hot springs carrying in solution a large quantity of lime and silica, which deposits directly the carbonic acid gas is liberated in the atmosphere, often producing a rock of the purest whiteness, or colored by any metal that the hot water may pass through.

Black marble is a sedimentary limestone colored by carbon, which color is immediately destroyed by heat, producing the whitest of lime oxide. We get black marbles with white veins; these white veins are usually younger than the rock itself, being infillings of the cracks produced by different causes in the history of the rock. These remarks about black rocks apply equally to red and yellow ones.

Another class of marble, the Breccias, have gone through all sorts of nature's changes and disturbances; they are rocks that have been broken into irregular fragments, and been cemented together again by nature, and after that, in some cases have gone through a baking process and the like.

Nearly all our green marbles are earlier rocks that have been altered, and in some instances been broken up and recemented, like Verde Antico. The greens are nearly all magnesia, while the whites in the same mass are lime; occasionally we get both white and green in the same mass. This slight geological introduction will prove to you that, as marbles are produced under such varying conditions, the quality must be equally various, both in hardness and durability.

Again, some marbles, like the Purbeck, are not much more than tremendously compressed mud and fossils, others are only baked compressed clays. When used in damp situations these often go back to their original elements, and it further happens that a marble that behaves fairly well in Italy frequently will not stand at all with us. And there are marbles that, like building stones, have to be placed on their natural bed.

Most marbles will stand in isolated shafts, or engaged pilasters, but experience shows us that only a limited number used as slabs for wall linings can resist the moisture of a newly built wall. The destructive power of this moisture, be it hydraulic or chemical, is such that it very shortly destroys the face of many marbles; all those of a slaty or sedimentary nature, when face-bedded, go directly, for instance, the Swiss Cipollino, but if cut across the bed this stands fairly well. Then again, certain marbles, like Purbeck, Emperor's Red, and Verona, which consist chiefly of flattish fossil shells, when face-bedded on damp walls become pitted with small holes, while across the bed they stand all right; nearly all this class of fossil marble is only obtainable in thin beds, so a large slab has to be face-bedded. These same remarks apply to certain red marbles found near Carrara, which are red clays compressed and baked by the same heat that has produced the crystalline whites.

When the Greeks used marble in architecture it was always treated as an ordinary building stone, no attempt was made to save material, everything was massive, and the blocks were ground or rubbed together until the whole structure was next to homogeneous, without the aid of mortar or cement. Their columns, as you are aware, were built with thick drums; these blocks were worked roughly in the quarries, with projecting bosses on the sides, to which, most probably, were attached some wooden arms to enable the blocks to be revolved forward and backward on wooden centers, until the two faces came together with an almost invisible joint. When built the whole column mass was skillfully masoned into a pillar with all the Greek subtlety of diminishing entasis and delicate flutings. This work, had it not been for earthquakes, and the ravages of man, would have been perfect now.

* Abstracted from an address delivered before the British Arcbitectural Association on November 1c, 1899.

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FIG. 1.—A GATEWAY.

FIG. 2.—UPPER PORTION OF GATEWAY.

FIG. 3.—SPECIMEN OF ROUGH MAORI WHARE.

FIG. 8.—CARVED FRONT OF A PATAKA.

FIG. 6.—LARGE SPECIMEN OF A PATAKA.

FIG. 12.—UPPER PORTION—ENTRANCE TO A WHARE PUNI.
FIG. 13.—LOWER PORTION—CARVED PROW OF A CANOE.

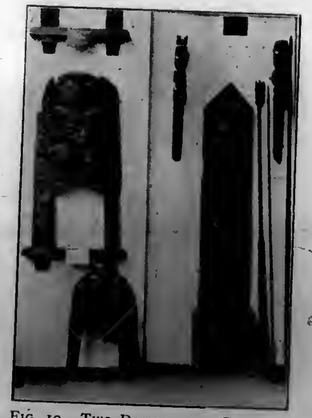
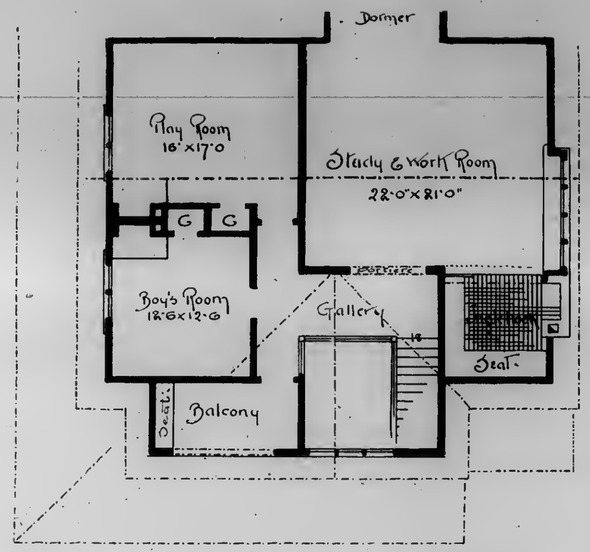


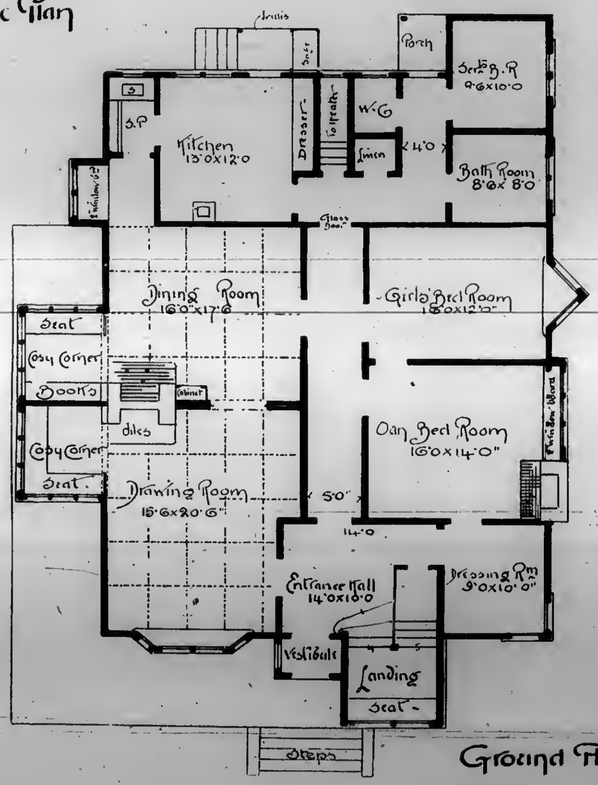
FIG. 10.—TWO DOORWAYS OF PATAKAS; CARVED WALL SLAB; TWO SMALL TEKO TEKO.

FIG. 16.—CARVING OF FIGURE HEAD OF CANOE.

SPECIMENS OF MAORI ART, ILLUSTRATING ARTI



Attic Plan

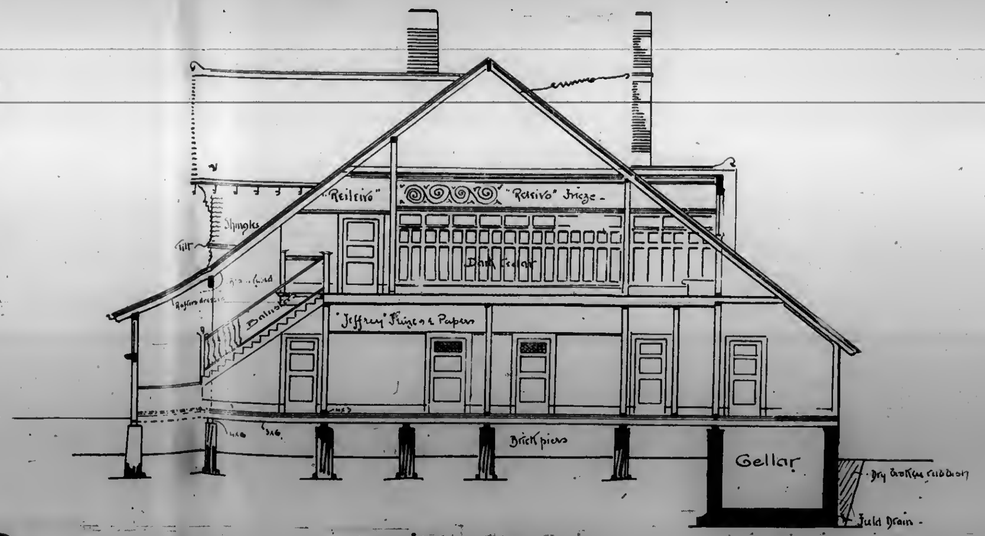


Ground Plan

Elevation to Road

Sketch
for a
Bungalow
to be built of
timber
on foundation of rubble
rock walling

R. M. Kapp. F.R.I.B.A.
Architect.
Aug. 1895



Longitudinal Section

Fig. 4.—Specimen of High-Class Raupo Whare.

Fig. 5.—A Pataka.

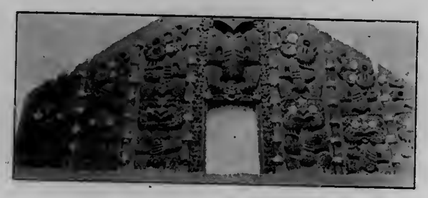


Fig. 9.—Carved Front of a Pataka.

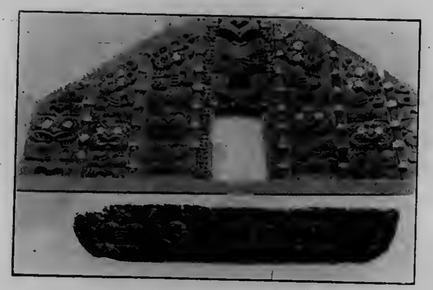


Fig. 11.—Ancient Piece of Carving.

Fig. 14.—Maori War Canoe.

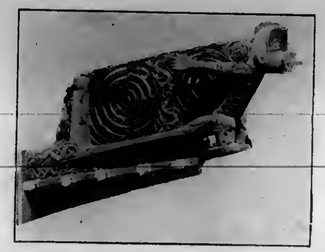


Fig 15.—Prow of Canoe.

Fig. 17.—Stern Post of Canoe.

Fig. 18.—Treatment of Figure Head of Canoe.

THIS NUMBER BY MR. R. M. FRIPP, F.R.I.B.A.

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CANADIAN ARCHITECT AND BUILDER.

VOL. XIII.—No 6. JUNE, 1900 PRICE 20 CENTS. $2.00 PER YEAR.

—THE—

CANADIAN ARCHITECT AND BUILDER.

A Monthly Journal of Modern Constructive Methods.

(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD).

PUBLISHED ON THE THIRD WEDNESDAY IN EACH MONTH IN THE INTEREST OF

ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

The C. H. MORTIMER PUBLISHING CO. of Toronto, Limited, Publishers,

Confederation Life Building, - TORONTO, CANADA.

Telephone 2362.

Branch Office: NEW YORK LIFE INSURANCE BUILDING, MONTREAL.

Bell Telephone 2299.

SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to foreign subscribers is $2.50. Subscriptions are payable in advance. The Journal will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrears of subscription paid.

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The Toronto Municipal Buildings.

IN our legal column will be found the terms of the decision of Mr. Justice Street in the action brought by the city of Toronto against the county of York, to determine the county's liability with respect to the cost of erecting, furnishing and maintaining the new municipal buildings at Toronto. The county contended that under their agreement with the city they were only liable for their proportion of the cost of the site and buildings, such cost being limited to $400,000. The decision of the Court, however, is that the county is also liable under the agreement for its proper share of the expense of heating, lighting and furnishing the court house.

Electrical Work.

IF report speaks truly there are many architects who know less than they should about electrical work. This is especially true of some of the older men in the profession, who apparently have neglected to study and acquire a sufficient knowledge of the subject. We hear of specifications being prepared by wiring contractors instead of by the architect, and of specifications prepared by architects which are too indefinite in their terms to be of much value. Of course an architect who cannot prepare his own specifications is not capable of judging whether or not the work has been properly done, and as the number of incompetent contractors in this line is said to greatly exceed those who are skilful and honest, much bad work is being done. True an inspection is made by the underwriters, but the work is beyond the capacity of a single inspector to perform. It is therefore incumbent upon architects to thoroughly acquaint themselves with the

requirements in this line and in the interest of their clients to specify the character of the work and judge of its efficiency when completed.

Signed Buildings.

THE Council of the Royal Institute of British Architects recently adopted a resolution, as follows: "That it is not derogatory to the profession for an architect to sign his buildings in an unostentatious manner, similar to that adopted by painters and sculptors." We should be pleased to see it become the practice of architects to attach their names to such of their buildings at least as they might consider to be satisfactory architectural examples. It would help to define more clearly in the public mind the character and duties of the profession, enhance public respect for it, and awaken greater interest in architecture. On the other hand, a stimulus would be given architects to design more carefully.

Canada's Mineral Production.

From the annual preliminary statement published by the Geological Survey of Canada, it is learned that the production of minerals in this country has more than doubled during the last three years, the increase for 1899 being 22.2 per cent., of which 15.52 per cent. is to be credited to the output of gold from the Yukon. Building materials contributed only 8.99 per cent. to the total production, the total value being placed at $4,250,000. There was a large increase in the production of cement. The quantities and values of building materials are given as follows: Asbestos and asbestic, 25,285 tons, value $483,299: limestone for flux, 53,202 tons, value $257,329; Natural cement, 131,387 barrels, value $119,508; Portland cement, 256,366 barrels, value $513,983; flag stone, $7,600; granite, $9,542; slate, $33,406. Some of the figures given above would appear to be under the mark, as for example granite, the total value of which is placed at less than $10,000.

Lessons from the Ottawa Fire.

NOT even a disaster such as the recent destructive fire at Ottawa has sufficed to lead to the adoption by the authorities of that municipality of proper safeguards to life and property. A few months previous to this calamity the Ottawa Board of Trade attempted to secure certain amendments to the building by-laws of the city corresponding with enactments already adopted by the leading cities of the United States and Canada, with the object of lessening the fire risk. These amendments were strongly opposed by some of the local contractors on the ground that they would result in restricting building enterprise. Some of the leading architects as strongly urged their adoption. Again since the great fire an attempt to restrict the use of inflammable materials was defeated. On the contrary the city of Hull has adopted precautionary measures in this direction. It is probable that when insurance rates in Ottawa are largely increased, as they are certain to be, the force of public opinion will compel the council to follow the example of the neighboring city.

Proposed Combination in the Heating Trade.

IT is learned on apparently good authority that American capitalists are endeavoring to secure control of the works of Canadian manufacturers of stoves and heating apparatus. The Canadian firms in this line were first approached on behalf of the syndicate to learn whether or not they would be willing to sell a controlling interest in or dispose of their business entirely. Subsequently representatives of the syndicate visited the various factories to make estimates of the value of the plant, buildings and patterns, and to learn, from an examination of the books what had been the profits of the last three years. The idea of the syndicate is said to be to close up some of the smaller factories and operate the others on special lines—that is to say, one would make nothing but heating apparatus, another ranges, another base burners, and so on, the capacity of each shop being made to equal the demand for the special line of goods manufactured. The Canadian manufacturers interested have been given until first December to decide whether or not they will sell out to the syndicate or keep in their own hands the control of their business.

Tests of Non-Combustible Wood.

A SERIES of valuable tests of wood rendered fireproof by an electric process, were recently made under the direction of the Board of Underwriters and the Building and Fire Department, of New York. Wood treated by this process was but slightly charred by being subjected to a temperature of 1,900° Fahr. A still more practical demonstration of its fire resisting qualities was shown by a recent fire in the Dun building, New York. So fierce was the fire that glass melted and iron twisted, but the "fire-proof" woodwork proved to be an effectual barrier to the flames, which by its agency were restricted to a single room. Material so effective in checking the spread of fire, should find extensive employment, especially in a country like Canada, where wood is so abundant. In the presence of such great conflagrations as those which have occurred at New Westminster, B. C., Windsor, Nova Scotia, and Ottawa, the larger use of fire resisting materials in the construction of buildings, should commend itself to the judgment of all. But if not, then public safety demands that the municipal authorities should legislate in this direction. We observe that a company has just been formed in Montreal to fireproof wood in the above described manner.

Toronto Technical School.

IT is to be hoped that another great mistake has not been made by the City Council in purchasing the Toronto Athletic Club building with the object of remodelling it for use as a technical school. The peculiar purpose for which the building was originally designed, makes it extremely doubtful if any portion of it beyond the four walls and the roof, could be made available for a technical school. Can it be considered economy to pay $60,000 for the site and outer shell of a building and an unknown amount on an attempt to adapt it to a purpose for which it was never intended? A wiser method would surely be to choose a suitable site, and erect thereon a new building which should be most carefully designed to fulfil the special requirements of the case. An influential committee of citizens was recently appointed to promote the establishment in Toronto of an Art Museum. The views of this committee should be sought regarding the proposed so-called technical school. This school ought properly to be known as the Toronto School of Industrial Art and Design, and as such should form a part of the Art Museum scheme. There should be prepared, a carefully elaborated scheme for the establishment in Toronto of a building, or group of buildings, to serve as the home of the arts. To such a group of buildings the above mentioned school would fittingly belong. It is therefore to be regretted that the Council should have acted with such haste in the matter, without allowing time for the consideration in all its aspects of the larger project.

ARCHITECTURAL EDUCATION.—1900.*

BY EDEN SMITH.

Last year The Architectural Eighteen Club, of Toronto, was invited by some members of the Ontario Association of Architects to give criticisms of the Association's work and suggestions for the better co-operation of architects in the interest of the profession.

An impromptu paper was read by a representative of the Architectural Eighteen Club at the Annual Convention of the Association, in January of this year, in which a suggestion of improvement in the matter of education excited enough interest to lead to the formation of a joint committee chosen from the Association and the Eighteen Club, to enquire into and report on this suggestion. The report this committee drew up was favorably received, and another committee was elected to get the scheme into working order, which it is now endeavoring to do.

We have no generally approved and accepted course of training for the architectural student. The usual system of a few years' apprenticeship in an average architect's office cannot be seriously taken as sufficient. That it really is not, is evident from the many attempts to supplement it with courses in Art schools and colleges and various systems of training; some of them very valuable to the student who is able to avail himself of them, although he finds himself after all his pains, placed in the eyes of the community on an equal footing with one who has obtained only the scantiest office training.

We have no system which gains the approval of architects as a body, as being the best course a student can follow to get an efficient training in that many sided business, the practice of architecture has become—"The harmonious association of all the crafts"—to use the words of Mr. Lethaby in an article in the "Quest," July 1896, on "Art, the Crafts and the Function of Guilds."

"That architecture is an association of such varied things as are some of the crafts, makes the education of an architect a matter of no small difficulty."

Architects have formed societies, with the intention of mutually advancing their own interests and that of architecture for the good of the community.

If it will not irreparably damage the dignity of the profession to compare these societies for a little while with a trade guild, we may get food for thought from some remarks of Mr. Lethaby's. In this same article he says:—

"Whatever the trade societies do or leave undone, they must ultimately if they are to continue, take up the overlooking of quality in the common interest. If society generally, gets to understand that the Unions, as far as may be, are interesting themselves in the quality of commodities, it will soon pay back the debt in sympathy."

Our commodity is architecture; it is our business as Guilds to improve the quality or raise the standard of it, and instead of grumbling at the community for its want of sympathy we "must discuss materials and methods and build up a new tradition of beautiful craftsmanship, and become by means of our societies responsible to the community."

First of the "materials and methods" must be the matter of education.

Some societies have established a system of qualifying for membership by means of examination, but without any sufficient course of education, but those interested in the subject of education, know now that education without examinations is of more value than examination without good education. If we are to be responsible to the community for the craft we must see to the making of the craftsman, and establish a standard of education.

In his work, the harmonious association of all the crafts, an architect should be one of the first to understand the most effective and economical way of combining different kinds of workers to get the most effective whole; but the fact that in his own education no system yet meets with general approval, seems to point out that this work has been neglected.

In the hope that this work may be further studied and experimented upon until some economical system is made known, approved of and adopted by the various societies, the following suggestions are offered:

The objection to the present system of apprenticeship in an architect's office, is that it is not possible to teach in the average office some things which are parts of the necessary mental equipment of an architect, and some of them only with great difficulty in any office, so that the student has to obtain them elsewhere. Some students may do this; many do not.

This inequality of training is a serious hindrance to the development of architecture, beside the fact that the well trained architect has to compete all along the line with the untrained one, who has learned in the office that part of his profession only which can be learned there, the commercial side, and who generally poses as the practical business man, which means a great deal to the employer who pays for the work. The student left to his own guidance develops himself in such an unsystematic way, that we hear such names as an "artist architect," which suggest to the business-like employer something impracticable, lacking such qualities as are suggested in the name "engineer," the man of exact science, as to be almost the opposite of it.

It is this separation of Science and Art which so tells against Art in this scientific age.

In bygone ages, the age of architectural precedent, the architect was the scientific man, or at least kept pace with the practical science of his time. Now through the fault of our training we have let science get so far ahead of us that the thought of looking one way for precedence and another way for progress, points out the gap between Science and Art.

The most important work of the art education of to-day is to repair that breach.

If the element of quality in workmanship or art has been brutalized in the name of science we have to find out how to debrutalize it.

We must recognize that the architect as well as being a business man and an artist, must be a man of science.

For the purpose of developing a scheme of education it would be well to think of these three things as divisions of his work: The art, science and business or craft of architecture, neither one of these greater or less than either of the others, but all of them equally necessary to form the symmetrical whole; all equally important for the sake of the community.

How, when and where each of these divisions may be best studied we may find out by examining the present system's weaknesses.

The office, though the best place for a business training, is a poor place as a rule for scientific instruction, and the average office at least, for art study.

The college is not a good place for business training, and is not likely to be the best for art study, while scientific instruction, because the mental training this requires depends so much on the routine, proper progression and relation of the various sciences, is best acquired in a scholastic manner, under such competent professors as are found in our School of Practical Science, and not picked up in a hap hazard manner in his later years, which the student even with difficulty finds is the best he can do now. It should have become part of his mental equipment, part of his thinking machinery as soon as he attempts to design.

We know a designer must understand the nature and functions of the materials with which he expresses himself. This is a scientific age. In these things he needs not only information, but training in the beginning to give him ease in the artistic use of them—not to come on them as obstacles which impede his work, and have to be laboriously mastered, or put aside as something which interferes with the present uncritical adaptation of dead precedent.

The time for acquiring this habit can only be found in the beginning of his career and for a few years, while time and opportunities for the other branches of his study may be found all the rest of his life. It need hardly be pointed out why a college course is not an effective training for the business part or craft of architecture, the harmonious association of all the crafts, to understand which, one must live among them, and be where the real difficulties come and where the problems are practically worked out.

And for the same reasons an art is never so well taught in a school or by professional teachers, as by real workers in that art, who live by the practice and not by the teaching of it, as in the atelier or studio where the patrons or masters are the men who have faced and worked out the live problems of the day, and who give that most valuable of all gifts, enthusiasm, and where the change and variety of teachers, of opinions and criticism, shines light in from the most diverse sources on every object.

We think that the practice of architecture has not the position in modern progress it should hold, because it is so imperfectly taught that few persons know what it is, and the first and best thing architectural societies can do for architecture is to raise the standard of the architect by fostering only the best scheme of education—not by legal restrictions and examinations without anything which could be called education, but by education first, and that this is the best way to earn the sympathy and good will of the community.

We believe that the system of a few years of indenture in an office can never be considered a sufficient training, but should be supplemented with a course in a school of science and studio or atelier arranged concurrently with the years of indenture.

The system proposed by the joint committee of the Ontario Association of Architects and the Architectural Eighteen Club of Toronto, is:

The student shall first pass the matriculation examination of the Toronto University, and then take transferable articles for a period of five years, during which time he will follow a specially arranged scientific course at the School of Practical Science, of so many hours per week, and a studio course of two months in the third, fourth and fifth years of his indenture, passing periodical examinations in practical office work.

* Paper read before the Architectural League of America.

ILLUSTRATIONS.

DESIGNS FOR ONE ROOM, TWO ROOM, THREE ROOM, AND FOUR ROOM SCHOOL BUILDINGS, AWARDED FIRST POSITION IN THE RECENT COMPETITION BY THE EDUCATIONAL DEPARTMENT OF ONTARIO.

The Educational Department of Ontario recently offered a series of prizes for designs of school buildings, suitable for rural localities. One hundred sets of plans are said to have been submitted by architects in this competition. By the courtesy of the Minister of Education reproductions of the selected designs are given in this number. The names of the authors are as follows: One room school, Mr. Harkness Toronto; two and four room school, Mr. J. Francis Brown, Toronto; three room school, Mr. H. C. McBride, London.

Below will be found an abstract of the authors' descriptive specifications accompanied by estimates of cost.

ONE-ROOMED SCHOOL.

The building has been designed for brick elevations, but with a few slight alterations in minor details is equally suitable for stone.

The basement walls are of stone and the gables and roof of shingles. The steps and floors of the porches would be of wood. The basement floor would be concreted.

All the woodwork in the building would be of a very simple description; the architraves, baseboards, etc., being plain with rounded corners.

The ground floor throughout would have a cement dado to the height of the window stools.

The remainder of walls and the ceiling would be plastered in two coat work.

The class room would be sand-stucco finished and painted a suitable tint. A picture mould would be provided and the angles at the ceiling in the class room would be slightly caved.

A recitation seat, a necessary adjunct to a single roomed school, is also shown on the plan in front of teacher's platform.

Heat is supplied to the classroom by a hot air furnace through two flues of the proper size discharging over the blackboard.

The room is ventilated by means of a flue leading from a register under the teacher's platform.

The girls' cloak room is heated through a register placed at some height above the floor, and the boys' through a register in the floor.

Both cloak rooms are supplied with vents, thus insuring the proper airing and drying of the garments left in them.

It has not been considered necessary to show inside lavatories, as such buildings are seldom, if ever, provided with a water supply or drainage system.

In the basement a suitable well lighted play-room is provided for the boys for rainy and cold weather. The furnace and fuel rooms occupy one end, being separate from the play room.

Attention is called to the arrangement of the separate entrances, and cloak rooms. This arrangement of the cloak rooms in direct connection with the class room and lighted from the outside is the one most approved by the best authorities on school architecture

Since the play-room in the basement is for the boys only, it was not considered amiss to give access thereto through the boys' cloak room.

The following estimates are made on the basis of first class workmanship and material at such prices as are likely to prevail in country places. The estimates do not include the seats, teacher's table, blackboards, or any other school furniture.

Excavation	$45
Masonry and concrete floor	440
Brickwork	365
Carpentry	615
Plastering	139
Painting and glazing	115
Heating	175
	$1,885

TWO-ROOMED SCHOOL.

The ground floor shows two well proportioned rooms about 24 × 32 × 14, scientifically lighted from the left of scholars, is provided with ample blackboard space and with separate cloak rooms for boys and girls to each room.

Basement is simply divided into play-rooms for boys and girls, and with heating and ventilating compartments compactly arranged.

The following has been avoided:— a two storey building, flat roof, tower, roof valley situated directly over entrances, combined cloak rooms, etc.

The heating and ventilation has been carefully considered and amply provided. A furnace with a capacity of 40,000 cubic feet is necessary, and may be a wood or a coal heater; two large brick or galvanized iron heating ducts convey heat to the class-rooms, and a hot water coil to teachers' room. Separate vent flues have been provided for each class room, with smoke flue adjoining to insure efficiency of operation; vent flues are calculated to exhaust air of class-rooms every twelve minutes when furnace is heating. Foul air ducts of heavy galvanized iron of ample capacity are connected with floors at the coldest positions in rooms at windows, and are carried at basement ceiling to vent flues; this arrangement being quite simple, economical and most effective. A foul air gathering room can easily be provided, but the author considers it no improvement. If foul air registers are placed other than as shown, cold air from windows travelling across floor to them, chill the feet of the scholars in the room, and impair the utility of the system.

Basement walls to be built up of local stone, and may be faced on interior with grey brick in colored mortar, wainscot to be alternate courses of red and grey brick, stonework above grade to be of broken ashlar or coursing.

Brick walls above foundation to be 14" thick laid up of sound stock brick in lime and mortar.

The estimate of the various trades is based upon recent work of similar description erected under the direction of author, and will be found quite reliable.

Masonry	$1,385
Carpentry	1,600
Plastering	200
Painting and glazing	140
Heating and ventilating	195
Galvanized iron work	85
	$3,605

If the roof is to be slated instead of shingled add $150.00

In some districts where labor and material is cheap 5 and 10 per cent may be deducted from the above amount.

THREE-ROOMED SCHOOL.

All the outside walls tinted blue on foundation plan to be built to the forms and dimensions shewn with large flat limestones.

All the exterior stonework above ground line where exposed to view to have stones laid with joints quite horizontal and vertical and to be rock faced.

All the walls colored red on plans and sections to be built up with good hard well burnt brick. All those used in foundation walls to be hard green clinkers.

The finishing throughout in clear red pine or black ash which will be put on proper bevelled grounds.

All wood-work to be of pine unless otherwise specified and to be thoroughly seasoned throughout.

The rooms on ground floor throughout to be sheeted up 4' high with inch matched and beaded sheeting in 3" widths and to be finished on top with moulded capping.

The building will be heated with one furnace for burning wood or coal. The furnace to be of sufficient capacity to properly heat the building up to a temperature of 65 degrees when the thermometer is 20 degrees below zero.

The following is the estimate of cost:

Brick and stonework	$1,900
Carpenter work	2,500
Plastering	170
Painting and glazing	300
Plumbing	400
Heating and ventilating	200
	$5,470

FOUR-ROOMED SCHOOL.

The ground and first floor plans have four properly proportioned class-rooms 24 × 32, are well lighted from the left of scholars with five large windows arranged to operate from top to bottom; ample blackboard space is provided at teacher's end of room; separate cloak rooms for boys and for girls are provided to each room.

Plan shows possibility of enlargement without disturbing present plan, and can be executed at the minimum of expense. Stairways and rear entrances would be central then and most convenient.

The heating and ventilation has been carefully considered and amply provided. Two furnaces with a capacity of 40,000 cubic feet are necessary and may be wood or coal heaters; four large brick or galvanized iron heating ducts convey heat to the class-rooms, and a hot water coil to teacher's room. Separate vent flues have been provided for each class-room with smoke flues adjoining to insure efficiency of operation; vent flues are calcuated to exhaust air of class-rooms every ten to twelve minutes when furnace is heating. Foul air ducts of heavy galvanized iron of ample capacity with floor at the coldest positions in rooms at windows and are carried at basement ceiling to vent flues; this arrangement is quite simple, economical and most effective.

The following objectionable features have been disregarded; flat roofing, extremely high ceilings, the arrangement of class-rooms with but a single wall or partition division between them, narrow or cramped hall or entrances, entrance doors exposed to overflow of roof valleys, combined cloak rooms, indifferent heating and ventilation, the placing of w. c. in building.

Basement walls to be built up of local stone, and may be faced on interior with grey brick in colored mortar; wainscott to be alternate courses of red and grey brick. Stonework above grade to be of broken ashlar or coursing.

Brick walls above foundation to be 14" inches thick laid up of sound stock brick in lime mortar.

Flooring to be first quality kiln-dried birch 3" widths for ground floor. Basement to be floored with wrought 6" plank on cedar sleepers. Furnace room floor to be of brick.

Trim windows and doors with 5½" double moulded architraves. Base to be 14" x 1¼" double, chair rail to continue around all rooms and halls, also black board mouldings.

The estimate of the various trades is based upon recent work of similar description, executed under the direction of author, and will be found quite reliable:

Masonry	$2,075
Carpentery	2,390
Plastering	360
Painting and Glazing	240
Galvanized Iron Work	105
Slating	330
Heating and Ventilating	350
	$5,850

It roof is shingled instead of slated deduct $150.00.

In some localities this design could easily be executed for less than the above amount.

BY THE WAY.

A PLUMBERS' strike at Halifax has terminated by all the strikers going into business on their own account. They will now have an opportunity to learn what an easy life is that of the master plumber, and how magnificent are his profits.

× × ×

THE City Commissioner of Toronto has been asked to find a suitable site for a handsome model of Windsor Castle, which was recently presented to the city by Messrs. Lever Bros., the well known soap manufacturers. The model was exhibited at the World's Fair at Chicago and afterwards removed to England.

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As a means of commemorating the devotion of the colonies to the mother land during the present war, the Rev. J. S. Sinclair, vicar of Cirencster, makes the suggestion, in the columns of The Spectator, that there should be erected in front of St. Paul's Cathedral, four great masts, set in emblematic bases and properly decorated, like to those in front of St. Mark's at Venice, to represent Canada, Australia, New Zealand and South Africa. The proposal has been favorably received.

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IT is gratifying to learn that the Canadian club propose to put a distinguishing mark upon historical buildings. The first step in this direction has been taken by placing on the old Canada Company building on King street, east Toronto, a granite tablet bearing the following inscription.—"The Canada Company building, built in 1807. One of the earliest brick edifices erected in Toronto. Occupied from 1853 to 1895 as the chief office of the Canada Company in this province." The house was built by the late Mr. Quetton St. George and is now the property of the Baldwin estate.

× × ×

UNDER the title of a "Lost Principle in Architecture," a writer in the "Fortnightly Review" says: "If the visitor to Athens places his hat or other small object at the corner of one of the steps of the Parthenon and tries to sight it from the other end he will find it has sunk beneath the delicate curve in the middle which the designers saw would appear pleasanter and softer to the eye than if each step were shaped to a line of ruler-like straightness from beginning to end. All parts of the great building—the floors, architrave, and even the layers of stone that constitute the main walls—have been shown to conform to a like principle, and some portions to be curved both in a vertical and in a horizontal manner. Important as was this discovery, it does not stand alone. Mr. Ruskin has found that deliberate divergencies of a similar kind exist in the old Gothic buildings of Venice, and he considers that they were introduced so as to avoid a too obvious precision, as does nature, even in her most symmetrical creations—the two sides of the human face, for example.

× × ×

IT may be remembered that the architect of the Imperial household of Japan, visited Europe, the United States and Canada last year in connection with the project to erect a palace for the Crown Prince's household and to contain some of the state offices. In view of the numerous earthquakes which occur every year in Japan brick structures are soon destroyed. Wood though better adapted to withstand the shocks is objectionable by reason of its inflammability. Consequently it was finally decided to erect this palace, to cost $3,000,000, on a framework of steel. The contract to design, manufacture and supervise the erection of this steel framework has been given to American firms. The fundamental principle and leading consideration in the design, says the Engineering Record, has been not only to provide for its stability under a single severe earthquake shock, but to ensure its endurance of numerous shocks continuing year after year at frequent intervals. To meet these strains and vibrations every part of the building is supported or reinforced by a skeleton steel framework made continuous throughout, so as to act as a whole to resist displacement of any part. There are very few adjustable members or loose joints. Nearly all connections are riveted with unusual strength, although they are not so rigid but that the members may deflect within the limits of their elasticity without injury. Special lateral strength and stiffness are introduced by systems of struts and ties in all the horizontal planes, which develop the strength of the beams and practically create great horizontal trusses to resist distortion and distribute strains. The masonry is massive, proportioned for stability, and abundantly anchored at all points to the steel framework. The solid continuous floors add to the strength and rigidity of the structure, and its stability is promoted by making the cornice, parapet and other upper parts as light as possible. The whole building is seated on wide continous footings of solid concrete, to which the columns are each bolted.

MONTREAL

Branch Office of the CANADIAN ARCHITECT AND BUILDER,
Imperial Building.

June 12th, 1900.

PLUMBERS' CONVENTION.

The National Association of Master Plumbers of Canada will meet in annual convention in this city on the 27th, 28th and 29th inst. The local plumbers are making arrangements for the entertainment of the delegates who may attend the convention.

NEW BRIDGE ACROSS THE ST. LAWRENCE AT QUEBEC.

For several years the project of bridging the St. Lawrence at Quebec has been before the public. It may now be said to be certain to be carried out, contracts having recently been awarded to Messrs. Wm. Davis & Son., of Ottawa, for the substructure, and to the Phoenix Bridge Co., of the United States, for the superstructure. Mr. E. A. Hoare, of Quebec, is engineer in charge of the entire work. The total length of the superstructure is 3,310 feet. The bridge is intended to carry two railroad tracks, two electric car tracks and two carriage roads.

THE NEW CITY BUILDING INSPECTOR.

The accompanying portrait is that of Mr. Alcide Chausse, architect, who has recently been appointed as head of the Building Inspection Department of Montreal. Mr. Chausse, who is a son of Ald. Chausse, and a native of this city, is 32 years of age.

MR. ALCIDE CHAUSSE.

He studied architecture in the office of Mr. A. Raza, and began practice when only twenty years of age. He is a member of the Council of the Province of Quebec Association of Architects, as well as of the Societe Nationale des Architectes de France, the American Institute of Architects, Societe Centrale d'Architecture de Belgique, International Congress of Architects (Paris, 1900). Mr. Chausse, whose appointment is coincident with the adoption of new building regulations, will have opportunity to put into operation many necessary reforms for the improvement of the architecture of the city.

A LEGAL DECISION OF INTEREST TO CONTRACTORS.

In the action of Beauchamp vs. Cyr, which recently came up before Mr. Justice Doherty in the Superior Court of Montreal, the plaintiff sought to recover $350 for work done and materials furnished for the construction of a stone encasing wall, under and in virtue of a contract entered into between the parties on the 13th November last. The defendant pleaded admitting the contract alleged, but averring that the work was very badly done, and with inferior materials: that the walls were packed with pieces of stone, whereas, they should have been packed with dry brick; that the mortar used was of very inferior quality, and contained too little cement: that the plaintiff did not lay the stone with a sufficient incline inwards; so that instead of leaning inwards, the walls worked outwards until they fell out; that the plaintiff did not place a sufficient number of iron bolts to support the wall: and that by reason of these defects of construction, the walls began to fall away before the work was finished; that defendant refused to accept the work so done; that by reason of the defects mentioned, the walls threatened to collapse; that since the completion of the work large portions of the walls had fallen down; that defendant had frequently notified the plaintiff of the conditions of his contract, and of the law, both verbally and by notarial protest; that the work not being completed according to law and the contract, the defendant was not now bound to pay, and the action was premature. The plaintiff answered this plea, denying these allegations, and alleging that his work was well done, and that if it be in the condition alleged by the defendant, it was due to the defendant's own fault and negligence, the only ground of complaint alleged by the defendant as to the work done by the plaintiff, which defendant had proved, was that the plaintiff had put in the spaces between and behind the large stones in the encasing wall in question, a number of small pieces of stone instead of brick—the testimony of plaintiff's own witnesses establishing that in all other respects the work was well done. The plaintiff did not by his contract bind himself to use brick for such filling, and in view of the extremely contradictory evidence as regards the comparative advantages of using stone or brick for such purposes, and of the absence of any proof that in the wall in question the mortar froze by reason of stone being used instead of brick—which was the danger which, according to plaintiff's witnesses was to be apprehended where stone is so used—it was impossible to say that the use of stone for such purposes instead of brick constituted such a defect of construction as to render the wall unacceptable, or that it contributed to bring about the falling out of a portion of the wall, which occurred some weeks after plaintiff had completed his work, and after the wall had been exposed to an extraordinarily heavy fall of rain, which lasted for several days. The preponderance of evidence established that the plaintiff fulfilled his obligations under the contract, and that the work was well and properly done. The defendant, since the institution of the action, had paid $220 on account, and the court, making a deduction of this amount, gave judgment in favor of the plaintiff for $130, ballance due, with costs of action as brought.

LEGAL.

THE CORPORATION OF THE CITY OF TORONTO VS. THE CORPORATION OF THE COUNTY OF YORK.—Judgment by Mr. Justice Street in Single Court at Toronto upon special case stated for the opinion of the court as to the proper construction of the agreement dated 26th June, 1884, between the corporations for the erection of a court house in Toronto. The agreement was validated by ch. 73 of 8 Vic. (o), and is set out in schedule A of the Act. The plaintiffs claim that the sum, not to exceed $400,000, mentioned in the agreement, includes only the cost of the site for and of the erection of the court-house as a completed building, and that defendants are also liable to pay to plaintiffs (beyond the "annual" sum payable in respect of the $400,000) their just share and proportion of the cost of the first furniture and other furnishings of the court-rooms and the offices connected therewith, and for other offices mentioned in said agreement. The defendants claim that the amount to be paid annually by them should be based upon the total cost of buildings and site, including original cost of such furniture as aforesaid, not in any case to exceed in all the sum of $400,000. By secs 11 and 12 of ch. 39 of 48 Vic. (o), sections 465 and 469 of the Municipal act then in force were amended so as to require accommodation, fuel, light, and furniture for the library of the Law Association of the County of York to be provided, and the liabilities of the municipalities therefor are therein defined. The learned judge is of the opinion that the scheme of the agreement is that the court-house is to be erected by, and is to be the property of, the city of Toronto, and is to be so built and arranged as to provide proper accommodation for the county and the administration of justice, and is from time to time to be heated, lighted, and furnished by the city. The county on its part agrees to pay the city from time to time its proper share of the expense of heating, lighting and furnishing the court house, and a just sum for its proportion of the use of the court house based upon its cost, such cost, however, not to be taken as against the county as exceeding $400,000. This sum was intended to cover the cost of buying the site and erecting the building, and not the cost of furnishing. The county pays its proportion of the annual outlay for keeping up the furniture, and in addition it pays a just sum annually for the use it makes of the building and the offices in it, based upon the assumption that the building and offices have, with the site, cost only $400,000. The argument to the contrary on behalf of the county is based upon the idea that "accommodation for the convenient transaction of business by the court and officers" could not be said to be provided, nor the building to be fully completed and ready for use by the courts until the court rooms and offices had been properly furnished, but the whole context of the agreement shows that these expressions refer only to the building itself, for everything else including furniture, is otherwise provided for and dealt with. But the city should provide accommodation, fuel, light, etc., for the Law Association. The agreement provides that the city "will assume and undertake the statutory obligations respecting a court house of the county of York for judicial purposes only," and that it will relieve the county therefrom. The libraries of the Law Associations of the different counties in the province are by secs. 506 and 509 of the Municipal Act recognized as a part of the outfit of the courts in the various counties in which they exist for the assistance of the judges and council in the conduct and decision of judicial matters. Order accordingly. Costs of the special case to be paid by the defendants to plaintiffs, except so far as they are increased by the question relating to Law Association, as to which by agreement there are to be no costs.

HOT WATER CIRCULATION.*

BY ROBT. W. KING, Mech. Eng., Mem. Can. Soc. C. E.

I am announced to read a paper on hot water circulation; to this title should be added, "With test for efficiency for hot water boilers," since my reference to the principles of hot water circulation will be mainly for the purpose of opening up the subject and illustrating the points that have to be met in designing a hot water heating apparatus to obtain the best general efficiency, and also to give a method or plan of testing the efficiency of a hot water boiler. In Fig. 1 B represents hot water boiler, F, firepot; S, smoke pipe; F P, flow pipe; R, return pipe; R A D, radiators. The dark portions of shading represent heat, light portions of shading, absence of the same.

One of the main objects to be obtained in a hot water heating apparatus is the economical absorption of the largest amount of heat resulting from the combustion of the fuel, by the water in the boiler, conveying it by circulation to the radiators, and thence to the air of the room to be heated.

The motive power of the circulation is the difference in temperature between the heat of the flow pipe and the return pipe. Water being made lighter in weight by heating, rises, while the colder water falls, and so produces a circulation of the water in the apparatus. In the same way, in illustration, the heating of air causes it to rise, while colder air falls to take its place, producing circulation of air. This is also the cause of wind, etc.

It will be noticed from the shading that heat from the fire is gradually being absorbed by the water in the boiler as the gases pass to the smoke pipe, and then it appears in the water and is carried to the radiators by the circulating pipes, thence to the air of the room to be heated, the water returning to the boiler, minus a large amount of its heat, to be again re-supplied. The lower radiator (No. 2) represents the action of the circulation where the water is admitted into the bottom instead of the top of radiator; the circulation is likely not to be quite as perfect in this form as the upper.

If will be noticed by the shading of the smoke pipe and upper portion of boiler that there is a larger proportion of heat shown in the smoke on the way to the chimney than in the water of the

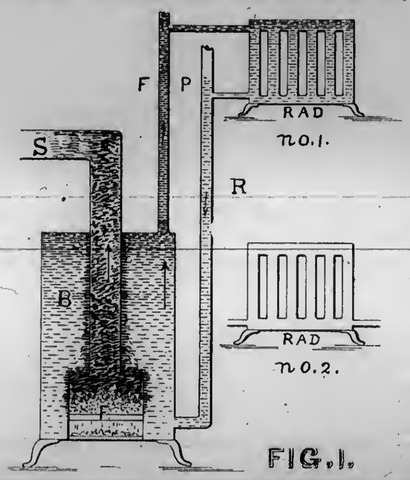


FIG. 1.

boiler at this its hottest part. This is necessarily so, since when the point is arrived at where the proportion of heat in the water equals the proportion of the same in the flue gases, the passing of heat from the one to the other must cease. Practically this point is never reached, so we here show the proportions as stated. Now we have in the form here shown two separate systems of circulation—one of the heat units in the flue gases, the other of the heat units in the water of the boiler. You will notice that the flow of these two circulations runs in the same direction. Now, could we reverse the direction of one of these systems so that the fire might commence its work where the water is hottest, and the gases be drawn to the chimney from the part of the boiler where the water is coldest, it is evident that we could by such means reduce our chimney gases to a much lower temperature, and thus absorb and capture a larger proportion of heat, increasing there-

*A paper read before the Toronto Engineers' Club.

by the economy of the apparatus in the consumption of fuel. But to follow this point further is not an object in this paper.

The next point I will touch on is the circulation of the water in the system, allowing that Fig. 1 represents a system where the circulation is open and free, and for comparison Fig. 2 represents a system where the circulation has been impeded. It is immaterial where the impediment to the freest possible circulation occurs,—if you block a water pipe a mile long at either end, or in the middle, the same result occurs as regards the amount of water that will pass through the pipe as a whole. Therefore an impediment to the circulation in the radiators, or the piping connecting the same to the boiler, will have the same effect on the working of the apparatus as a whole, as it would were the piping and radi-

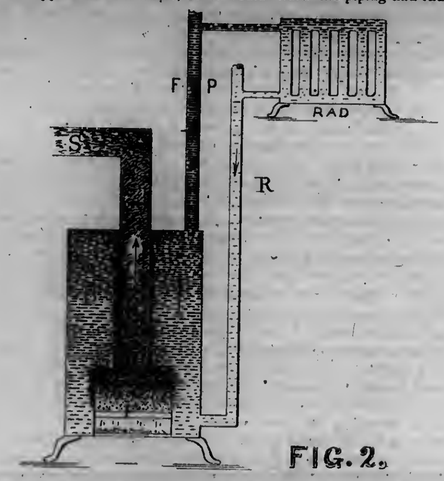


FIG. 2.

ators free and the impediment in the boiler itself. This is an important fact to remember.

I will now proceed to illustrate how any defect in circulation injuriously affects the economy of the system as regards consumption of fuel. An impediment to circulation having occurred, as in Fig. 2, the water not having free access from the boiler, remains longer in contact with the heating surfaces of the same. The heat continues passing from the flue gases to the water in the boiler in greater quantity than the lessened circulation allows to pass to the radiators, until the heat damming up in the boiler itself causes it to become congested or over heated, until the boiler surfaces assume such an elevated temperature that but little, if any, heat can pass into the boiler from the flue gases, consequently more heat must pass to the chimney, causing waste of the fuel that produced it.

The effect on the radiators is, that they being deprived of the heat for distribution that has been wasted as above explained, cannot radiate it into the rooms to be heated, and become on that account incompetent to perform the duty that may have been assigned to them. Fig. 2 is represented by this condition, you will note the flow pipe appears hotter and the return pipe colder, but the total heat given out will be necessarily less. Continuing to press the firing under these conditions in order to heat the room, results in an increased proportional waste of fuel, until the point may be reached where the boiler makes steam, and disorganization generally of the system takes place.

In regard to the laying of the connecting pipes it is necessary to have them free from all air traps or places where air can gath-

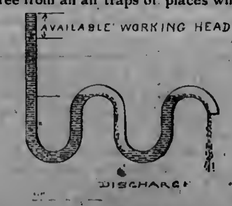


FIG 3.

er. To force water through a coil such as is represented by Fig. 3, requires a head equal to the combined height of all the bends.

With two bends one foot high, it will require a head of over two feet to force water through, air being allowed to remain or gather in the coil. For this reason perpendicular kinks or bends in horizontal flow or return pipes to a radiator whose height would equal the diameter only of the pipes, would almost, if not quite, close the circulation to that radiator. Since this imperfection would be noted, the chief danger lies in those bends or kinks that may close off only a smaller per cent. of the efficiency of the radiator. Lack of heat in the room will likely be blamed by the fitter on anything but his own bad workmanship or design. Where bends or drops in a pipe are unavoidable, the air traps thus caused can be relieved, and the pipe restored to its full circulating value by the running of air vents to above the water level or connecting to expansion tank, etc., as the requirement of the particular case may demand. This same principle applies to the circulation or flow of water in other pipes, such for instance as that unfortunate piece of engineering illustrated in the laying of the Toronto waterworks pipe across the bay, which, owing to the irregular shape of the bottom of the bay is not likely to be laid perpendicularly in line. There is another difficulty here, namely, that every entrapped cubic foot of air, when under water, has a lifting power of about 62½ lbs. Now by relieving these traps or upper bends (which must necessarily be in the shallower water) by some efficient device or plan so that air cannot, to any serious extent, collect or gather in the pipe, the flow of the pipe will be restored to its normal capacity (which the mere holding of the pipe down by a weight of cribbing stone or sand will not accomplish) and the desire of an iron pipe to tear itself apart in order to take a swim on the surface of the water will be over come.

In further support of this theory, allow me to point out: First, that air or gases did accumulate in the water works pipe, since by no other possibility could it, an iron pipe, float, and the fact of now holding it down by cribbing, etc., indicates that further accumulations of air are expected to re-occur and probably already exist. Secondly, that when a pipe contains air it cannot contain water to its full capacity, and as previously noted, it matters not where the impediment to the freest possible circulation occurs, hence it follows that the capacity of the pipe as a whole to convey water is reduced to the full extent or proportion of the air accumulation at any one point. Thirdly, a large accumulation of sand or other settlings was found in portions of this pipe. The presence of settlings in any portion of a pipe denotes that such pipe has not sufficient current passing through, or sufficient drainage or head to prevent settlings from accumulating, and this condition can be brought about in the first place by an accumulation of air as referred to, reducing the current or flow of water through the pipe, the more open parts of which then assume the duty of settling basins in the pipe itself. It should be the duty of the engineer in charge to examine the portions carefully to discover if it is not possible to not only restore the flow if impeded, but also to increase it in other ways. This might avoid the present necessity of the expensive tunnel proposed by Mansergh, and still give the increased capacity claimed to be required. It is not my wish that these remarks be taken as claiming to locate by one example the source from which all the difficulties occur, since there are other phases to this question of doubtful reputation, leaving considerable choice in the matter, but I have referred to this as being akin to my subject, which I have desired to make as widely interesting as possible. It has thus been shown that though the boiler in a system may be correctly designed and efficient under one system of radiation, it may entirely fail to accomplish the work expected of it in another, and that from no fault in the boiler itself. Also, that radiators may fail to heat the space assigned to them from defects in the boiler or in some other part of the system, as for instance the size or arrangement of the connecting piping as will be afterwards described.

Thus it will be seen that in seeking to determine the efficiency of a hot water boiler or radiator, or in fact any of the units of a system as a whole, the individual unit in question must be treated apart from other units of the system. Further, in reference to the connecting pipes between boiler and radiator, it is important that they be correctly proportioned in size or area to the various parts of the radiation they have to supply. Since the motive power of the circulation is due in part to the height of the driving columns multiplied by their areas, it follows that on the different floors different proportions in the area of the connecting pipes are required, so as to distribute to the radiators on the different floors their proper area of circulating power. By estimating the average height of floors one above the other at even distances we are at least within the mark in stating that in a house with basement, the effective proportional area of connecting pipes per square foot of radiation should run so as to give an excess or proportional area, etc., for the lower floor, of three to one of the upper floor. This may be put in more practical shape by proposing to determine from best general practice a common unit of proportional area per square foot of radiation, which may be used when once obtained in all cases for determining, according to the nature of the work, whether or not sufficient circulating area is provided in the boiler itself, or in the radiators themselves, or in the connecting pipes individually. This unit will be used as follows: Radiators having been selected and placed for the different floors, the sizes of the pipes individually required will be determined by multiplying the square feet of radiating surface in the radiators by the unit, and then by three for the radiators on the ground floor, by two for the radiators on the middle floor, and by one for the radiators on the upper story. These sizes or areas will determine by examination of the design if the individual radiators have sufficient water way in themselves, and the sum total of these areas will determine if there is sufficient water way in the boiler itself.

I will note here that since a pipe of 4 square inches area will convey more than double the water of a pipe of 2 square inches area, this difference should be taken into account, and may be found tabulated in books of reference. I will also note that it is important that the boiler be placed so that it may give an effective height to the circulating pipes in the basement equal to the average stories in the house. A boiler where the return pipes fall completely to the floor and begin to heat immediately on rising therefrom, will thereby utilize the full height of the basement for enforcing circulation, and its waterway will be of more proportional value than in one less effectively placed, for which due allowance must proportionately be made. In cases where the basement lacks sufficient height, the ground floor radiators are the ones most unfavorably affected. A lack of circulating force to a radiator can be improved by piping to the top of a radiator as in No. 1, instead of to the bottom as in No. 2, and may help in some instances to acquire the necessary amount.

I will close this portion of my subject by a few deductions that may be arrived at from the reasoning that has preceded. In competitive boiler tests in which it has been attempted to make all conditions except the boilers the same, the most efficient boiler may show the lowest average temperature at the point where the circulation leaves, and not the highest, as has been ignorantly supposed must always be the case. Boilers that compel the water to follow a tortuous course in order to keep the same water as long as possible in contact with the heating surfaces, destroy the heat absorbing efficiency of those surfaces, impede the circulation and are therefore of inferior and ignorant design. Radiators that compel the water to follow a tortuous course, so that it may travel through all of the loops in order to be as fully cooled as possible, (though the effect may be to show the hottest water entering the radiator and the coldest when leaving it, as compared with other radiators) are wrong and inefficient in design, inasmuch as it has been shown that that system, as a whole, may be the most efficient where flow and return, or in fact all parts of the system, are nearest to the same temperature. Such a radiator was attempted to be put on the market at a recent date, but failed I believe in accomplishing its object.

The desired efficiency of a hot water heating plant, as a whole, cannot be insured simply by the purchase of a boiler or radiators of good design, which may be guaranteed of high efficiency when correctly installed. The correct installing of a hot water, or in fact any heating plant, involves engineering questions about which, as a rule, the average man calling himself a steam fitter or pipe fitter knows very little. The employment of such a man in an engineering capacity is the direct cause of so many failures in such plants to do the duty expected of them. It is criminal economy to use too small connecting pipes to save first cost of apparatus. Also in using less leads than the boiler is designed to supply and plugging or reducing the unused holes intended for circulation.

Under some conditions it may be necessary to increase the area of circulation provided for general purpose or discard the boiler if this is not possible. It is necessary for the man who takes up this work expecting to succeed (unless by accident) to acquaint himself with such principles as in part have been enumerated, but which, owing to the limited scope of this paper cannot be further enlarged upon.

Having shown that in criticising the efficiency of a hot water circulating plant as a whole, it is necessary to independently handle the different units therein, we will now proceed to the

latter part of this paper namely, how to test the efficiency of a hot water boiler apart from its radiators and connections.

Most engineers are, in a way, familiar with the testing of steam boilers, but for hot water boilers I have not yet met with any method in use that will fill the requirement which is open to ordinary mortals to follow. I say ordinary mortals, since it is a custom in the higher schools of science and art, to so burden such investigations with algebraical logarithms, formulars, calculus, etc., combining so little practical information that ordinary mortals are excluded from following or find life too short to take up the subject in that way. In considering the task before us we will find we have three measurements to accurately obtain, on which to base calculations as to the amount of heat units captured by the boiler. These are:—1st. The temperature, or in other words the proportion of heat units in the water when it enters the boiler. 2nd. The temperature, or in other words the proportion of heat units in the water when it leaves the boiler. 3rd. The rate or quantity of the flow of the water.

It is comparatively easy to obtain the first and second values but not the third, because of the necessity of procuring an instrument delicate enough to measure the rate of flow correctly, that can be put in a pipe without obstructing it and so impeding the circulation, with injurious results. There are ways proposed for measuring, or I would rather say estimating the amount of water passing in a pipe without obstructing it, one of which only I will refer to in order to show the difficulties to be contended with.

FIG. 4.

Let A B be a pipe with water flowing through it; at points A and B we tap in small pipes, C and D, and bring their other ends together and turned upright as at E. The head or force of the circulation will be represented by the difference in height of the water in the two columns at E. Having ascertained the head and the size of the orifice through which the water flows, the amount passing could be accurately calculated but for one thing, the allowance necessary to be made (scientifically the coefficient) for the friction of the piping, or in other words the impediment to theoretically free circulation. To obtain this correctly requires other tests and experiments of a complicated character, also the differences in height of the columns at E being very small, would have to be taken by microscopic and micrometer measurements, difficult to obtain. There is another trouble; since the main circulating pipes will be found in the basement, the ends E might have to be extended a considerable height. This would necessitate note being taken of the temperature of the water in these columns, so that any variation in weight therefrom could be calculated. Furthermore, as during the test the rates of temperature and flow will be continually changing, observations would have to be continually made. This applies also to the proposition to use an ordinary water meter, could one of sufficient delicacy be found. When you consider in connection with this mass of figures, the skill and care necessary to obtain final results correctly, you will not wonder that the ordinary mortal referred to is discouraged and dismayed. Still the problem is before us and the question is, if we can't make a frontal attack is there any way to get around. Every man has his own way of doing things, and without wishing to show any disrespect for the methods of others, to which if presented I shall only be too pleased to listen, I beg your kind indulgence while I explain what I think is one solution of the difficulty, and afterwards invite discussion or criticism of it for mutual benefit and interest.

We have already shown how the efficiency of a boiler may be influenced by defects in the system. For the purpose of testing the efficiency of the boiler itself, I disconnect it from its system of radiation and treat it separately. It has already been explained that there are three measurements to be taken, and complications arise where the three measurements are unknown quantities that are constantly varying at all times during the test. In my test I endeavor to relieve this complication by making two out of the three measurements "known quantities" and constant at all times during the test, thus leaving practically only one measurement to be dealt with during the test, and proceed to explain briefly as follows: To the boiler, Fig. 5, is attached flow and return pipes of the full capacity provided for in the boiler, running upwards and connected to an expansion tank in the ordinary manner. In the overflow of the expansion tank at T, is placed (in preference) a recording thermometer or an ordinary thermometer as opportunity may offer.

Discharging into return pipe of the boiler is a pipe, T 2, carrying a known quantity of water per minute at a known temperature. With this our testing apparatus is complete. Let me here explain how the latter part of this apparatus can be made. Roughly, I would propose an ordinary closet tank maintaining water by tap and float at a stated level. From this tank a pipe leads to the return pipe of the boiler, the discharge of which under the head of water in the tank has been measured and adjusted to suit requirements. In the arrangement as illustrated herein, a set valve is shown at X for adjusting the rate of discharge. In such cases the total discharge at Y should be measured in bulk so that the average maintained during the test may be the better verified. A better plan would be to introduce a suitable and reliable water meter at X, were one obtainable.

For most accurate work I have devised a special water meter driven by clock work that will not only accurately measure an even continuous flow, but also automatically record the same. For obtaining a constant-known-temperature, water from a tank of melting ice should be used, or an ordinary water service which will run a stream at constant temperature. But to be exact in in this measurement a thermometer should be placed at T 2, so that should there be any variation in this temperatnre it can be noted and allowed for, though complicating the calculation to some extent.

Now let me say a word on the thermometer and meter. I may be a crank on automatic machinery, possibly it is inherent laziness on my part; but instead of putting ordinary thermometers at the points indicated and depending on taking their readings correctly (so I could swear to them,) every five minutes or otherwise during a 24-hour test, I want to put automatic recording thermometers there, say of the Callender pattern, that require no watching and will give results to a fraction of a degree and time, whose records can for evidence be photographed and reproduced in print, free from the possibility of personal error. So also with the measurement of the flow, but to explain such instruments would take one or more papers, so cannot be entertained at the present time.

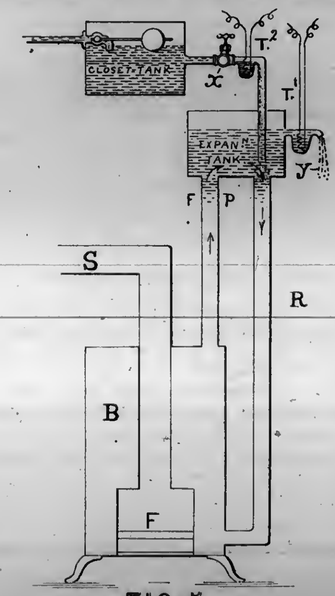


FIG. 5.

Having rigged my testing apparatus, we will proceed as follows:—The apparatus being empty of water, we will start our water meter, stopping it when the water gets to overflowing, so that we may know the first contents. At the finish of the test the heat remaining in this water above the normal will be one of the quantities to consider and add to main results. Our apparatus

and the boiler being now full, we will start the fire on a measured quantity of fuel, and make a mark on the time record of the thermometers. When the water in the expansion tank has acquired an ordinary working temperature, the time being automatically noted or othewise, we start the water to circulate through the meter at a rate previously decided on as in proper proportion to the size of the apparatus, and allowing the party interested in the economy of the boiler to fire up to the best of his knowledge or ability. With automatic instruments our work is over until the completion of the test, the recording instruments being under lock and key they cannot be tampered with—it being only necessary to insure further that the fireman is honest in regard to using no fuel but that measured out to him, so that the quantity of fuel burned during the test may be determined in the usual manner.

At the close of the tests we consult the records, which are then the records of what has been performed. Our report therefore will show, backed by the records and evidence referred to, that by the consumption of a certain amount of fuel during a stated time, in a hot water circulating boiler, we have raised the temperature of a stated quantity of water a certain number of degrees, the average being determined from the temperature curves that the thermometers have recorded, thus giving a simple data for obtaining both the efficiency and power of the boiler. The test would also show clearly at what part of the firing the best results were being obtained, and so be a guide in this respect and in determining the best proportions for the fire surface, etc.

From the data recorded as above, it is a comparatively simple matter to determine the number of British Thermal Units that have been abstracted from a stated quantity of fuel during a certain time for comparison with other absolute tests that may have been elsewhere made of other boilers, so giving their relative efficiency and power. Also by reducing the values to what they would be in steam evaporation from and at 212° F, the efficiency and power of a hot water boiler is made comparable with that of a steam boiler. This may seem to be getting into complicated calculations which we desired to avoid, but that depends, like the test itself, on how you take it, whether by frontal attack or by getting round. For instance if you ask a college professor for a rule for determining these values, especially as regards the steam comparisons, if he is unkind at the time he may present you with something like this, stating it has been founded on experiments and is a fairly accurate guide for a frontal attack.

$$\text{Log. } p. = A - \frac{B}{T} - \frac{C}{T^2}$$

Where A = 6.1007
Log. B = 3.43642
Log. C = 5.59873
P. = Pressure
T. = Temperature

But if he is kindly disposed at the time he may tell you that for his part he usually gets around it by consulting a book of tables to determine these values, where the whole thing is figured out for you in a reliable manner.

THE ONTARIO ASSOCIATION OF ARCHITECTS.

CONSIDERATION is being given by the Council and Committees to the educational and other matters to which the Association will direct its attention the coming autumn. It is expected that the new Association rooms will be ready for occupation about the first of September. Meanwhile, it is desired that architects should urge their students to register in accordance with the resolution adopted at the last convention.

Messrs. Beaumont, Jarvis & Co., architects, of Toronto, have recently opened a branch office at 39 Sparks street, Ottawa.

At the regular meeting of the Toronto Engineer's Club, held on the 13th inst., the topic for discussion was "Freight Traffic on City and Suburban Tramways."

Joint Commitees of the Ontario Association of Architects and the Toronto Builders' Exchange, are considering the terms of the form of contract at present in use in Toronto, with the object of amending some of its provisions, if it should be found advisable to do so.

The following members of the Canadian Society of Civil Engineers have been appointed a committee to conduct tests and establish standards of quality of cement: Prof. Bovey, McGill University, chairman; M. J. Butler, C. B. Smith, T. Munro, C. H. Rust, P. A. Peterson, and G. A. Mountain.

STUDENTS' DEPARTMENT.

ARCHITECTURAL LEAGUE OF AMERICA.

The second annual convention of the above organization was held on the 7th, 8th, and 9th inst., in Fullerton Hall, and the rooms of the Chicago Architectural Club and the Chicago Chapter of the American Institute of Architects, Art Institute Building, Chicago, the following clubs composing the League being represented: The Cleveland Architectural Club, the Chicago Architectural Club, the Cincinnati Chapter, A.I.A.; The Detroit Architectural Club, The Architectural League of New York, The T-Square Club, Philadelphia, Pa.; The Pittsburg Architectural Club, The St. Louis Architectural Club, The Toronto Architectural Eighteen Club, The Washington Architectural Club. There were also present a number of visiting delegates from cities where branches of the League may not have yet been formed. The programme, which was closely adhered to, was as follows:

THURSDAY, JUNE 7.

Rooms of The Chicago Architectural Club, Art Institute.

9 A. M.—Meeting of the Executive Board.
10 A. M.—Committee to confer with Committee from American Institute of Architects.
Committee on Code Governing Competitions.
11 A. M.—Registration of Delegates.

Fullerton Hall—Art Institute.

1. P. M.—Call to Order.
Address of Welcome, J. C. Llewellyn, President of The Chicago Architectural Club.
Response and Address, Albert Kelsey, President of The Architectural League of America.
Roll call of delegates and representatives.
Appointment of Committee on Records and Publicity.
Election of Speaker and Secretary.
Election of Auditors to examine and report upon the Treasurer's accounts.
Reading of Communications.
Annual report of the Executive Board. Henry W. Tomlinson, Secretary.
Treasurer's Report, Herbert B. Briggs, Treasurer.
Reports of Standing Committees.
Club Organization and Management, William B. Ittner, Chairman.
Municipal Improvement, Cass Gilbert, Chairman.
Schedule of Circuit Exhibitions, Henry W. Tomlinson, Chairman.
Reports of Special Committees.
Committee on Co-operation with A. I. A., Dwight Heald Perkins, Chairman.
Code Governing Competitions, Julius F. Harder, Chairman.
Permanent Constitution, Julius F. Harder, Chairman.
5 to 8 P. M.—Informal Reception to The Chicago Architectural Club and its guests by the Builder's Club, fourth floor, Chamber of Commerce Building, S. E. cor. Washington and La Salle streets.
8 P. M.—Joint Meeting of The American Park and Outdoor Art Association and The Architectural League of America,—to which all interested in Municipal Improvements are cordially invited.
8 P. M.—Fullerton Hall, Art Institute.
W. M. R. French, Director of the Art Institute, presiding.
"Municipal Improvement," a paper by Mrs. Edwin D. Mead, of the Twentieth Century Club, of Boston, read by C. M. Loring, President of the American Park and Outdoor Art Association.
Illustrated with stereopticon.
"Municipal Development," Albert Kelsey, President of The Architectural League of America.
Illustrated by stereopticon.

FRIDAY, JUNE 8.

Fullerton Hall—Art Institute.

9 A. M.—Reports from clubs on the year's work and accomplishments.
Report from clubs on circuit schedule and appointment of committee for coming year.
"Philadelphia's Traveling Scholarships," William C. Hays, Philadelphia.
"Indigenous and Inventive Architecture," Elmer Grey, Milwaukee.
"The Education of the Architectural Student," Prof. A. B. Trowbridge, Cornell University, Ithaca. Read by Henry W. Tomlinson.
"The Architect," Frank Lloyd Wright, Chicago.
1.30 P. M.—Train leaves Illinois Central station, foot of Van Buren street, for Jackson Park, (57th street,) thence by coaches through Jackson and Washington Parks, Michigan Boulevard and Lake Shore Drive, through Lincoln Park to Bismarck Garden, where supper will be served during concert.
8.30 P. M.—Business Session to take up unfinished work.

SATURDAY, JUNE, 9.

Fullerton Hall—Art Institute.

9 A. M.—"Our Duty," W. Dominick Benes, Cleveland.
"American Architecture as opposed to Architecture in America," Ernest Flagg, New York. Read by Dwight Heald Perkins.
"The Licensing of Architects," A. O. Elzner, Cincinnati. Read by O. W. Drach.
"Progress before Precedent," J. F. Harder, New York.
Unfinished business.
Designation of place and time of next Annual Convention.
Election of Officers of the League and Executive Board.
Adjournment.

RECEPTION AND DINNER GIVEN TO THE DELEGATES AND VISITING FRIENDS BY THE CHICAGO ARCHITECTURAL CLUB, IN THE BANQUET HALL OF THE AUDITORIUM, JUNE 9—8 P. M.

TOASTS.

D. H. BURNHAM, Chicago, Toastmaster.

Welcome, ... By the Toastmaster.
Response . . . . . The New President, J. C. LLEWELLYN.

Music.

"The Architectural Club as a Factor in Public Affairs," ADIN B. LACEY, Philadelphia.
Solo . . . . . ARTHUR R. DEAN, Chicago.
"The Young Man in Architecture," . . LOUIS H. SULLIVAN, Chicago.
"Are Architectural Societies and the Architectural Press fulfilling their Whole Mission?" . . ARTHUR D. RODGERS, Boston.
"The Convention," . . . . DWIGHT HERALD PERKINS, Chicago.

The papers deserving of special mention, presented at the convention, were as follows: "Indigenous and Inventive Architecture," by Elmer Grey, Milwaukee; "The Architect," by Frank Lloyd Wright, Chicago; "The Young Man in Architecture," by Louis H. Sullivan, Chicago; "The Architectural Club as a Factor in Public Affairs," by Adin B. Lacey, Philadelphia; "The Convention," by Dwight H. Perkins, Chicago.

Mr. Sullivan, remarking upon Mr. Grey's paper, said in part:

"The historical styles in themselves are absolutely without value as such and will not bear analysis. They were the expression of certain men who lived at a certain time. If these men, who lived at such times, were noble minded and of noble spirit and heart, their work is noble. If their minds were degenerated, their work is degenerated. All these qualities you will find depicted in the architecture of the past, running from the highest to the lowest, from the most noble to the most degenerate. The form in which these thoughts or feelings, or the lack of thought or feelings as they are disclosed, have nothing to do with the case when fundamentally considered. As Mr. Grey has truly said, the style is the evolution, if there be nothing other than the expression of its personality. If three men happened to think and feel something alike, the work of those three men will appear something alike. The same can be said of a thousand men acting and feeling the same way. That is practically all that can be said relative to the consideration of the national style as applied to the individual work. What counts, what is final and of consequence, is the individual. This has always been true, is true now and always remains true. What the individual thinks and feels makes him either a valuable or valueless member of the age in which he lives. If anyone supposes that by study, however reverent or serious it may be, in the spirit in which the past expresses itself, makes himself such valuable member, he is woefully mistaken. It may be true that he regards those expressions with reverence because he regards all expression of the mind with reverence. It has been suggested by Mr. Grey that by virtually relinquishing all the distinct forms of those styles we might finally reach a definite expression of our own. I see no reason why that would not be the result. There can be nothing else. A form which represents one state of feeling may not apply to another state of feeling. As, for instance, take the style of Francis I, it will not apply to the present age, nor conform to our national feeling. Francis I and the men of his day are dead, and will stay dead. Let us suppose, if it is possible to suppose, an architect, filled with the same spirit, influenced by want of sympathy, and under certain circumstances should build the same house in New Orleans that he builds in St. Paul, the people of New Orleans occupying such a structure would find it to be exceedingly uncomfortable. The first effort should be to adapt it to the comforts of the people with reference to the place where they live. What has style to do with it? This thought may be carried all through the discussion we have before us. What is the use of talking about books or about the styles we have passed? We have before us a simple plan. Examine any ordinary building with a little care and you will find it has the expression of one idea, solely and organically unfolding itself to the smallest detail. Therefore, if I talk about books or style, what will we gain by ignoring the fundamental law of development. A moment's reflection and serious thought will fill you with the correctness of the idea contended for. I know of no reason why that should not be the true idea: that architecture is the true expression of our lives."

An interesting paper, which appears on another page, was also presented on "Architectural Education," by Mr. Eden Smith, President of the Architectural Eighteen Club, of Toronto.

The report of the Chairman of the Committee on Municipal Improvements recommended co-operation on the part of the League with the local organizations already existing in many cities for the purpose of promoting public improvements, such as planting of trees, laying out parks and squares, placing of public monuments, etc.

Philadelphia was selected as the place of meeting next year. Mr. J. C. Llewellyn, of Chicago, was elected president under the constitution which has just been adopted, which permits the committee to elect the president only. The president, with the Executive Board of his Club, must then, within 15 days, appoint the other officers who will form the Committee of Management, these officers to be selected from clubs within a radius of 300 miles of the city to which the president belongs. The object in making this condition is, that the members of the committee shall be within easy call of the president, and be available for business meetings when required.

It was decided that Toronto should have an exhibition in the League circuit, the date being approximately fixed for January 25th to February 5th, 1901. An invitation was also tendered to the League, through Mr. J. P. Hynes, the representative from Toronto, to hold the annual convention of 1901 in that city, but the vote went in favor of Philadelphia, which was more largely represented at the meeting. The invitation from Toronto was, however, most heartily received, with cheers for the Queen and Toronto, and it is probable that should a larger delegation be sent next year, the convention of 1902 may be secured.

THE COLOR OF STONE AND ARCHITECTURE.

The magazine called Stone, prints the papers on the above subject read by Messrs. H. B. Gordon and John Gemmell at the last convention of the Ontario Association of Architects, and comments thereon as follows :—

"Messrs. Gordon and Gemmell are men of wide experience and of excellent reputation in their professions. What they have to say must carry weight. But architecture is not a matter for hard and fast rules, like all of the fine arts, its development comes from the expression of individuality. Every architect insensibly leans toward some individual mode of expression and try as he may to modify his style to suit various purposes, the personal element is, of course, always to be found in his work. Mr. Gordon, among the suggestions that he presented, said : "The colors of building material, if there is any variation in tone, should be darker at the base of a building and lighter as they ascend." No one will dispute this as a general proposition and one that is safe to be followed in most structures, and yet the genius of an architect may produce a most admirable and beautiful effect by the exact reversal of this rule. A striking illustration of this fact is given by one of the latest works of H. H. Richardson, whose death was the greatest loss American architecture has sustained. Few finer buildings arose under the inspiration of his genius than the City Hall, at Albany, N. Y. The building itself occupies a commanding site and yet one that is especially trying to any building. It is at one side of a large open square with a park at each end. Directly opposite is the towering granite pile of the State Capitol. At one side is the white marble State House of severely classical design. Diagonally across the square is the Albany Academy, a beautiful structure of brownstone in the Renaissance style, a fine example of the architecture of the early part of the century. Mr. Richardson, in his design for the City Hall, followed out his characteristic style, but introduced a daring innovation as pleasing as it was unexpected. The lower part of the building and all of the main walls are of light colored stone, while the trim and the entire upper portion of the beautiful campanile tower are of dark brown sand stone. One has only to look at such a building to see how impossible it is to fix hard and fast rules such as Mr. Gordon gives. To a genius like Richardson, ordinary rules were playthings.

Mr. Gemmell' s paper is worthy of every consideration and yet the final word with regard to it can only be that it is merely an expression of his own personal preferences. Perhaps every one will agree that the architecture of our cities in the years gone by was depressing, from its lack of variety in the materials employed. The long rows of brownstone houses, about which he complains, can find few defenders not because the brownstone was an unsuitable material or lacked in beauty, but wholly because there was nothing to relieve the monotony of block after block of such buildings. The same may be said of different blocks of red brick buildings. We doubt if any stone ever quarried is beautiful enough to be used exclusively, without trying the eye and displeasing the aesthetic sense. The argument from the classical cities of antiquity in favor of nothing but light colored building material, counts for little in view of the entirely different conditions of modern life and architecture. In proof that a dark colored stone produces a beautiful effect when properly used with due regard to the style of the building and the surroundings, one has only to point to Trinity Church, New York. Few would have the hardihood to claim that Old Trinity would be improved if a light colored stone were used instead of the dark one that was employed, or that the edifice will not, at the very least, bear comparison with Grace Church or St. Patrick' s Cathedral, in New York.

At present everything is in a transitional state and no one believes that the final word as to city architecture has yet been spoken. The finest effects in the future we firmly believe will be produced by skilful massing of different colors in stone and brick work, with an idea to general effect as well as to the effect in the individual buildings. The rich warm tone of some of the sandstones will produce beautiful harmonies when offset by the granites, marbles and limestones and we shall welcome the time when they are all freely used in the large business and public structures of a city. As an illustration of what may be accomplished by the skilful use of color in building material, we wish to quote the experience of a very successful builder and contractor in one of the large cities of this country. This man has built row after row of stone dwellings and apartment houses and he has had unusual success in selling them all rapidly and at satisfactory prices. He attributes his success to the fact that he has confined himself to no one building material but has made free use of every suitable stone. He does not build an entire block of brick, or limestone, or marble, or granite, or sandstone, but employs them all freely. He does not alternate them with checker-board effect, but masses the color so that each house shows to the best advantage and acts as a foil to its neighbor. When all of our builders and architects learn this lesson American architecture will take on a new meaning and importance. At the present time, when a great office building is erected of a certain stone and the effect presented is pleasing, the owner of the adjacent block is apt to erect a building of the same material, with the result that each mars the beauty of the other. If contrast instead of similarity were attempted, the beauty and consequent value of each structure might be enhanced."

QUESTIONS AND ANSWERS.

BUILDER, Ont., writes :—Would you kindly answer the following questions : 1. How is mason-work measured, as regards openings? Is it lawful to deduct all openings from the solid work? 2. When brick is laid at so much per M. to be measured in wall, on kiln count, does the builder lose all openings?

ANSWER.—Replying to the above, we may say that the first question is generally a matter of agreement before the work begins. If arrangements have not been made, then local custom rules, whatever that may be. If the bricklayer furnishes the bricks, he should have half the openings to cover waste and extra cutting. If the owner furnishes bricks and mortar, then the bricklayer only measures the solid wall, but should charge enough per M., to cover extra work about openings. Answering the second question : Bricks laid by the thousand, should be paid for by the thousand only, regardless of openings. This of course would be kiln count. Where a bricklayer contracts to lay bricks by the M., he is supposed to make his estimate big enough to cover any extra work on openings, cornices or string courses.

THE BUILDER

[THIS DEPARTMENT IS DESIGNED TO FURNISH INFORMATION SUITED TO THE REQUIREMENTS OF THE BUILDING TRADES. READERS ARE INVITED TO ASSIST IN MAKING IT AS HELPFUL AS POSSIBLE BY CONTRIBUTING OF THEIR EXPERIENCE, AND BY ASKING FOR PARTICULAR INFORMATION WHICH THEY MAY AT ANY TIME REQUIRE.]

Color in Rooms.

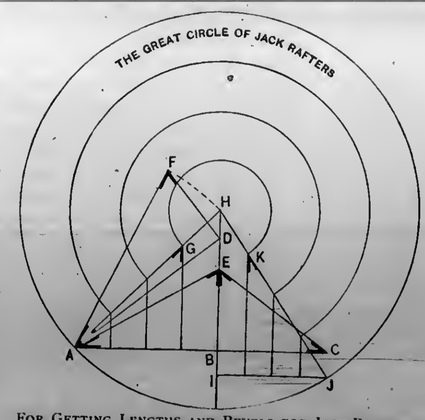
FEW matters in the finishing of interior of dwellings cause more concern than that of color. The tendency of opinion with regard to finishing the woodwork and walls in a house, is to have "variety," some rooms finished dark, others in light shades. While it may be true that "variety is charming," it is not exactly true that good taste demands that one room should be finished in dark colors, and the next one to it finished in white or light buffs ; the best effects are made where rooms are all finished in middle tints. These tints need not be all in one color, but should be chosen with a knowledge of the relations they bear to one another, if harmony is desired. Dining rooms may be made somewhat darker than other rooms, for where a table is set it certainly looks better if the surroundings are of a receding character. Citrine, or blue of medium depth and with greyish hue, looks well for the wall of a dining room, and a maroon dado is very suitable. It is desirable that the spread table andthe viands have prominence given to them by the shade of the walls. Our table-cloths, however, are too strong in effect; instead of being white, they should be of a cream tint, for the general repose would not then be disturbed, and yet the table would have sufficient prominence given to it. The emblems of a feast, fish birds and beast, may sometimes be incorporated with decorations, particularly in the windows, if colored glass is used, but the drawings should be of a conventional character. Parlors or drawing-rooms may be decorated in lighter tints, but it must be remembered that white is always a very chilly color, and furniture cannot look well against a very light wall. Here light tints of a warm hue may be indulged in with good effect, if taste is displayed in harmonizing the tints which, when properly done, induces cheerfulness and promotes conversation. Bed-rooms should be made to look cheerful and cosy, and for this purpose should be finished in the same color, having red as a motive, but pinks should be avoided. Terra-cotta or light brown with a reddish cast may be used with good effect, and sometimes, for a young lady's bed-room, a dark lilac, with terra-cotta trimmings may be used, but this latter will require handling with skill. A smoking den is the one room where the grotesque and humorous may be allowed, but the grotesque, both in color and decoration, must be clever and vigorous, to be effective. In all rooms the appearance of effort should be avoided, and there should be no display of wealth beyond the capacity of the owner, yet, there should be a feeling of "competency" in every room. If special richness is to be indulged in, bestow it upon the library, where all the surroundings may be made to harmonize with the costly bindings of the books.

Staining White Pine.

THE fashion of staining white pine in imitation of more expensive woods does not seem to be in good taste, unless the work is exceedingly well done. The sham is at once apparent, and the effect is garish and vulgar. White pine itself is a beautiful wood for interior finish if properly treated, hut the soft, silky texture of the grain is spoiled by the attempt to imitate walnut or cherry. Where other than the natural color of the wood is desired, artistic effects may be produced by making use of some of the aniline dyes, and staining in the various tones of green, light brown and yellow, which preserve the grain and texture of the wood, and may be made to harmonize with the surroundings. Of course, the dye, no matter what the color, must be put on lightly and evenly. No sandpaper must be used, and the whole work should be finished in white shellac, which may be rubbed down after the whole is dry and hard.

Lengths of Jack Rafters.

IN the formation of hip-roofs, two difficulties generally confront the young workman—first, the finding of the length, bevels and cuts of the hips, and second, the finding of the lengths and bevels of the "jacks," or cripple rafters. The first difficulty has been dealt with in these columns a year or so ago, so we will confine ourselves in this item exclusively to jack rafters. Let us examine the diagram shown herewith, and which



FOR GETTING LENGTHS AND BEVELS FOR JACK-RAFTERS.

was invented by Mr. J. P. Hicks some years ago, and which he has named "The great circle of jack rafters." If A B represents the long run of the common rafter, B E the rise, and A E the length, then a bevel set on E

and A will give the down bevel, and A will be the flat-foot cut. B C is the short cut of the common rafter, B E the rise and C E the length; a bevel set at E on the line C E will give the down bevel, and at C the bottom bevel. B D is the short run of the common rafter and the same as B C; then A D is the run of the hip, D F the rise, and A F the length of the hip rafter. The bevel at F is the downbevel, and at A the bottom bevel. A H shows the hip rafter dropped down to position. To find the length and bevel of the jacks for the side of roof having the short run of common rafter, space the jacks on the line A B and draw perpendicular lines joining the hip line A H for the length of jacks. A bevel set on the angle at G will give the bevel across the back. The down bevel is the same as that of the common rafter for the short run, and is shown at E on the line C E. H is the apex of the triangle formed on the side of the roof having the short run of common rafter. It is evident that the apex of the triangle formed on the side of the roof having the long run of common rafter must be at the same point, therefore H is the apex of the hip and of the common rafters from either side of the hip. Now, to find the lengths and bevels of the jacks on the side of the roof having the long run of the common rafter, measure down from H to I the length of the common rafter on the long run, which is the same as A E. From I set off the short run of common rafter to J, connect J with H, which places the hip rafter in position for finding the lengths and bevels of jacks on the side of the roof having the long run of common rafter. Space the jacks on the line I J and draw perpendicular lines joining the hip line J H, which gives the lengths of jacks. A bevel set in the angle at K will give the bevel across the back. The down bevel is the same as that of the common rafter for the long run, and is shown at E on the line A E. The circular lines show that taking H as a centre the triangle H I J will swing around opposite the triangle A B H, and bring every jack opposite its mate on the hip line A H, thus proving the correctness of the method, as well as showing how to space the jacks correspondingly. It will be noticed that this system can be adapted to unequal roofs as well as to those that are uniform, or of equal pitch, a very important feature.

Weighting Windows.

In hanging sashes the weights should be so adjusted that the lower sash will just balance the weights nicely, then use the same number of pounds for weighting the upper sash, and, as the upper sash is always lighter than the lower one, owing to the fact that the bottom rail is invariably wider than the top rail of the upper sash, the weights attached to the upper sheet will hold it tight against the top of the frame, and yet will not prevent the sash from remaining where placed when in use. If the weighting of the upper sash is not done properly, it will drop below the meeting rail, or, if locked, will throw all the weight on the sash lock, a very undesirable condition, as it will, in many cases, be almost impossible for delicate fingers to open the window when wanted. Sashes, to work nicely, should be fitted snug in their runways, not so tight, however that paint or moisture will prevent their working. Good cotton cord is better to use for hanging than hemp or manilla, as it works smoother, and, if lightly coated with hard mutton tallow when put in place, will last a long time and run quite smoothly. Of course, very little tallow must be used.

EXTRAS AND OMISSIONS IN BUILDING CONTRACTS.*

By E. H. Blake.

Building contracts had, said the author, been described as "the most complicated and most difficult, and, in many respects, the most unjust contracts that commercial enterprise had ever been able to achieve." But the words, spoken some fourteen years ago, were hardly so applicable now. A contract to erect a building could never be a simple one, being arranged between two parties by a person who was no party to it, and yet had large powers under it, and being subject to a whole schedule of conditions. The contract might be unjust to either party. The builder might suffer from having to estimate for matters which were either in ignorance or by design left uncertain, with a view to getting competing tenders; and, again plans and specifications from which a builder is expected to "erect a complete building' might in themselves be incomplete or impracticable. It was true that most architects or engineers would not shirk their own share of responsibility for imperfect plans; but there were important cases which showed that, where they did, the law was with them. The risks to which the two parties were liable might be summed up as in the case of the building owner—excess of cost over contract price, failure of builder, and delay through weather, strikes, etc.; in the case of the builder, strikes variations in price of labor and materials, failure of owner, accidents to workmen, faulty plans and quantities and penalties. A reasonable contract reduced the element of risk to either party to a minimum. One of the most difficult matters to settle was the question of extras and omissions. The knowledge of the employer on such matters was limited, and his intentions were often not very clearly defined, even in his own mind. The architect could only advise, and act as the employer's agent; but he had no implicit authority to alter the terms of the contract, even though the owner generally by his contract conferred large powers on him. There was sometimes a lack of confidence between architect and builder, and the contract conditions must, therefore be exactly defined.

All extras should be subject to a signed order from the architect, and the price be based on a previously deposited schedule. The avoidance of any misunderstanding should be secured before signing the contract, preferably by the care of the surveyor in taking off the quantities. The quantity surveyor's work must be exact, and could not be matter of opinion, so far as labors and materials went. There was so much to be done and used or there was not; but insufficient descriptions were often responsible for inaccuracies. The question of liability of the surveyor for inaccuracies depended much on his position and mode of appointment. The case of "Priestly v. Stone" was well known. The quantities were taken out from unfinished drawings, and the architect afterward altered the drawings and specification and submitted them with the original quantities as a basis for tendering. It was held that there was no privity of contract between quantity surveyor and builder, although in spite of this judgment it was still customary to hold the surveyor morally liable to the builder for inaccuracies. The moral aspect of the case as regards the owner who might receive work for which he had not paid, must also be considered. Quantities should, of course, be prepared by a qualified man, and time should be allowed for their careful completion. The author recommended that they should be made part of the contract. It was unfair to issue bills of quantities for the purpose of tendering while repudiating all responsibility for their accuracy, merely allowing a week or so for the contractor to verify them. This practice was happily dying out. It was very important that in all stages of the proceeding the employer should be kept informed of his liabilities to the quantity surveyor and to the builder. A strong opinion had recently, in the case of "Torrome v. Scott," been expressed by the Lord Chief Justice, that quantities should be taken out by an independent person. The essence of a just contract was exchange, in strict equity, of cash for kind. "Extras" were all works not included in a contract, for which instructions were given. "Omissions" might occur where quantities formed part of the contract. "Extras" might arise through exigencies not previously known to exist. Where they do not form part of the contract, works necessary to complete were not extras, though not shown or specified. In this connection the author would refer members interested to the cases of "Sharp v. San Panto," "Thorn v. London Corporation," and "Bottoms v. York," which were all instructive from various points of view. It has been held again and again and again by the Courts that the plans, specifications, etc., were in the nature of information enabling the builder to

* Abstract of paper read before the Surveyors' Institution, London.

tender, but no warranty of accuracy or practicability was implied. The cases seemed to indicate that some amendment of the law was necessary, and that meanwhile contracts must be very carefully drawn. The best way was, the author held, to make quantities the basis of the contracts, the contractor then being liable only to do work for which he had tendered a price, and the owner only entitled to receive value for which he had agreed to pay. A contract for a complete work included everything necessary to the completion thereof, it being immaterial that such works were omitted from the drawings or specifications, or that certain things were impracticable, or understated or miscalculated. In the case of impracticable plans, where quantities were not part of the contract, authority given to the architect to order extras did not empower him to order work necessary to make plans practicable. Should he order as an extra anything indispensably necessary to the contract, unless his certificate was a final and conclusive one, neither he nor the employer was liable to the builder, who was held to know that the matter was necessary to the completion of the contract. If a contractor had no confidence in an architect, he should avoid a contract which gave the architect sole power to interpret the meaning of all points under the same, for in case of impracticability there might be a difference as to the mode of completion. If the contract contained an arbitration clause, it would be a matter for reference whether the proposed mode of completion came within the contract. An architect, if not generally empowered to order extras, must obtain the employer's instructions. If the contract demanded his written order, he must be careful not to certify for anything done without such order. If quantities did not form part of the contract he must not order as extras, or certify for as extras, anything indispensably necessary to completion. There was apparently no implied authority to an architect to order extras. He must be expressly authorized, and the question of his authority was one for a jury. It was, however, the custom to regard the architect as the employer's agent in the fullest sense of the word. Although a contract required written orders for extras, a final and conclusive certificate including amounts in respect of extras would render the employer liable. A verbal promise to pay for extras was valueless. All orders should be transmitted to the builder through the architect in every case. It had been decided that even where interim certificates described and included additional work such certificates did not dispense with the necessity for written orders. It was to be noted that the measuring surveyor had no authority with respect to performance under the contract. He had to deal with facts and matters placed before him by the architect. The granting of a final certificate required great care. If the architect certified as to extra work which had not been done, or was indispensable, the employer must pay unless he could prove negligence, or fraud, or collusion. The case of "Rogers v. James" was quoted in this connection, as well as that of "Tullis v. Jackson." To come under the heading of extras, additional work must be done under orders issued during the execution of the contract, all subsequent orders coming as a matter of fresh transaction. In the case of considerable variations during the execution of the contract, the work must be considered "extra," provided there was evidence that the parties agreed to its being subject to contract terms. Where departure from plans involved a fresh class of work or material, such extra work was beyond the contract altogether. It was, however, customary to stipulate that no variations should vitiate the contract; but that all authorized extras and omissions should be measured and valued. An architect had no power to substitute one class of work or materials for another without adjustment in the final settlement. All dealings between builder and employer should, as he had said, be conducted through the medium of the architect. If, from any cause, it were necessary to substitute other material or work for those specified, the architect must be apprised of any extra cost, and sanction must be obtained in the manner provided in the contract. If, however, the contract were one involving a necessity to complete, within a definite time, for a certain sum of money, it would be at the contractor's expense that other materials or work were substituted, subject to the sanction of the architect. If the cost to the contractor were less, the employer could not claim a reduction. The architect should have full power to reasonably extend the time for carrying out a contract if the delay were due to extras ordered. The important case of "Dodd v. Churton," decided, with reference to the case of liquidated damages for failing to complete within a certain time, that if the delay were consequent on orders for additional work, the contractor was exonerated from payment of damages, unless there were an express agreement to the contrary. Great difficulty frequently arose from the adoption of old forms of contract with added clauses which overlapped the main clauses, especially in the clause referring all matters in dispute to an arbitrator, and the clauses making the architect's decision final. The author, in conclusion, dealt with the adjustment of accounts, which he said was generally left to the surveyor who prepared the quantities, who had a priced copy of the bill of quantities deposited with him at the beginning of the contract. The question of incorporating the quantities as part of the contract must be determined by the circumstances in each case, and the decision in "Priestly v. Stone" should be carefully considered as governing the law at present under the particular conditions obtaining in that case. Above all, fairness to all parties was the essence of a sound contract. No enmity should be allowed to influence the dealings between contractors and employers, and the proper duty of the surveyor was to eliminate as far as possible all uncertainties and points of dispute before the signing of the contract.

PRIZES FOR ESSAYS.

The National Educational Association of the United States offer the following prizes:—For the best essay submitted on each of the following topics: The seating, the lighting, the heating, and the ventilating of school buildings, $200.

For the second best essay submitted on each topic, $100.

Each essay shall be limited to 10,000 words and shall be submitted in printed or typewritten copy without signature, but with name of author enclosed with it in sealed envelope and addressed to the chairman of the committee at Emporia, Kansas. Three copies of each essay shall be submitted. They must be mailed not later than February 1, 1901. The essays and envelopes will be properly numbered for identification and the former forwarded to three experts to be hereafter appointed by this committee. Each expert will be ignorant of the appointment of the others and their combined judgment shall determine award. Should no essay on any topic be found worthy of an award and publication, the committee reserve the right to withhold the same.

The council reserve the exclusive right for the National Educational Association to copyright the prize essays and to publish the same for general distribution.

The essay on ventilation should include full suggestions concerning the use of disinfectants.

Should the awards on two or more essays be made to the same person, he will be permitted to revise and unify the manuscript before publication by the committee.

BUILDING CONDITIONS.

The unusually high price of most classes of building materials, more particularly lumber and metal goods, coupled with the demands of workmen for increased wages, is affecting unfavorably building enterprise. At Ottawa, where in consequence of the recent fire a large volume of building was in prospect, there has been a deadlock resulting from the demand of the builders and laborers for a substantial increase in wages, bnt the difficulty is now at an end. The season is advancing and unless labor troubles are speedily adjusted and prices of materials shall rule lower than at present, there will be much less building done than was anticipated.

Mr. M. J. Hynes is said to have sold to the Perth Amboy Terra Cotta Co. his patent kiln for the burning of terra cotta. The special feature of this kiln is that the fire, after passing up through the walls to the top of the kiln, is brought down again through the centre, thus heating the kiln more uniformly throughout.

A new Plumbing Board has been appointed at Ottawa, of which the City Engineer, Mr. John Galt, is chairman. The other members of the Board are Dr. Robillard. Wm. McKinley, plumber, and E. L. Horwood, architect. The Board have carefully revised the local plumbing by-law and submitted same for the approval of the council.

The American Institute of Architects have begun the publication of a quarterly Bulletin, the first number of which is before us. It comprises fifty pages, 7×9½ inches in size, devoted to chapter notes, a list of competitions for government buildings, a list of publications received during the quarter, and an index of literature from the publications of Architectural Societies and Periodicals on Architecture and allied subjects which are sent in exchange to the Institute. The Bulletin is edited and compiled by the secretary of the Institute, Mr. Glenn Brown.

MASONRY STRESSES.

The most valuable lessons and principles in structural science are derived from failures when intelligently investigated, says a writer in the Contract Journal. The range of duties imposed upon structures not being always sufficiently anticipated often leads to failure. Materials not weathering according to reasonable anticipations is likewise a source of failure. A frequent cause is the execution of the work of a class inferior to that upon which computations of strength are based, seemingly ignoring the weakening effect of weather and local exposures to which structures may be subject. It is here to be observed that very few tests are made of the strength remaining in old materials, which have been in service in particular lines of duty. The information to be derived from this class of tests is not less important than that of new materials. It reveals the probable decrease of strength which all new materials of the like kind, to do duty in like conditions, must be expected to undergo, and which should be duly allowed for. The proper factor of safety to be allowed in structures is in some instances more a matter of following authorities than the result of a due investigation of the vital conditions which are inseparable from the problems of the case.

It may be a simple enough affair to compute certain generally recognized stresses in masonry structures according to ordinary rules and in the general modes in which they are set forth and discussed, say, in text-books. But to have to realise that you must be individually responsible for the sufficiency of the computations reaching to and covering all the conditions practically involved makes it a serious matter. Anticipating all the conditions and factors which may be actually involved in masonry stresses often requires searching investigation. No text-book example can be expected to anticipate local exigencies, and it is these which the practitioner must find out and investigate for each case according to its needs.

In usual methods of computation the full section is treated as if the whole area were available for sustaining the load. Suppose a masonry pier, for instance as it is the most tried type of structure, and its statical stresses are regarded as the most precise. All masonry, we know, consists of facework, backing, and filling, whether it be ashlar, block in course work, coursed or uncoursed rubble, the latter sometimes called random rubble. Each of these four kinds of masonry vary, according to circumstances, as to size of blocks of stone, quality of dressing, care in laying in pier, selection of stone, quality of mortar, nature of the filling, and so forth. The filling in even of ashlar or block in course work is invariably of rubble, and of an inferior class according as the filling space affords room for large rubble stone or spawls and chips only. Even when rubble stones are filled in, much spawls and chips are thickly bedded in mortar, so that although it occupies a large part of the sectional area, it can take but little of the stress until the facing shell with closer bed joints yields sufficiently to bring the filling into bearing duty. The large proportion of mortar in the filling when of lime will shrink more or less and remain soft for a long time, hence the capacity of the filling to take a share of the pier load is not of a promising nature. With cement mortar, when properly indurated, the case would be different, depending on its quality. Most of the failures of piers of Norman and Gothic cathedrals are due to the inferior masonry of the filling. The shell of facing stones carried all the load that was assumed to be distributed over the entire cross-section of the pier. Since there are very wide differences in every description of masonry in the four types already named, not only in achitectural work, but to a greater extent in engineering masonry, there should be discrimination in their adaptable loads. For instance, ashlar masonry, assuming it for argument to be all ashlar throughout the section, would have different bearing capacity for different size blocks. Thus blocks containing but a quarter of a cubic yard, would have much less bearing strength than blocks of a cubic yard to 1½ cubic yards—i. e., 40 cubic feet. This assumes that the blocks, large and small, are all solidly bedded throughout the entire area of the bed, but in the larger beds this is difficult if not impossible in ordinary conditions of stone setting, except the contact beds are all dressed to true corresponding planes. Though large masses of stone have greater unit strength than the small cubes used in testing, from which the data of crushing loads are obtained, compound structures are not so strong as monoliths. The ratios of the respective strengths is not a constant quantity for general use, and therefore difficult to apply. In the case of piers that have great height as compared with their least thickness, some diminution of strength must be allowed for. In many descriptions of masonry piers the loads are not applied axially, so that the resultant cannot pass through the centre of the section. This disparity may cause a diminution of strength up to a third in a homogeneous structure, but much greater disproportion when only the pier shell takes the full load stresses.

In recent years many practitioners prefer to take the "cracking" instead of the "crushing" strength of materials as the real criterion of strength. They argue that in practice crushing of a structure should never be approached, and that cracks indicate the full permissible extent of failure to which it can be allowed to go before being protected. The additional load necessary to crush a specimen after being cracked varies with different materials. Mr. W. G. Kirkaldy published some specimen tests, which included the "cracking" and "crushing" forces for various kinds of stone under their quarry names for the London and North-Western Railway engineer. In a few cases the cracking and crushing was simultaneous, and in others up to about one-sixth less load was required to crack than to crush the specimen. The specimens were in many instances from one to four diameters high, the higher prisms giving less resistance than the lower ones, which were 6 in. cubes. The difference in these also varied up to about one-sixth of the cube results less for cracking than for crushing.

The stresses which may disturb the stability of a pier are exposure to heat and cold, causing expansion and contraction, of sub-structure and super-structure, live or varying loads, in the case of roads, railways, stores, etc., strong winds. The failure of the towers of the Niagara Suspension Bridge, which were completed in 1855, and replaced a few years ago by iron structures, is instructive. They were 90 ft. high on American side and 80 ft. on Canadian side, and were of compact limestone ashlar, laid in cement. The load was 36 tons per square foot of section. The towers were bedded on the country rock of the Niagara gorge, and were full of cracks in all directions, when examined by Mr. L. L. Buck the engineer, in 1887, the most serious being

vertical fissures caused by pressure. The stone was the compact limestone of the neighborhood; the upper stones of the quarry were laid in the base of the towers, about 20 ft. high on the Canadian side and 10 ft. higher on American side. The stone from the lower quarry beds were laid in the upper portion of the structures which was found most perishable. There were a pair of towers at each end between which the railway and the highway road underneath it passed. The superstructure of the towers was in the form of the frustrum of a pyramid 15 ft. square at the base and 8 ft. square at the top, where the iron saddle with the roller bed is bedded upon the masonry. When the masonry towers were taken down many of the stones were found to be only half bedded, which gave rise to complex stresses in the towers, and was one cause of failure.

Having briefly reviewed the most prominent disparities which occur in practical instances to more or less extent, it evidently becomes a question of supreme importance in each case to determine the value of these factors as far as they apply. The suitable factor of safety cannot be determined intelligently without such investigation, but when they can be satisfactorily ascertained a more economical factor of safety can be used to cover what still remains doubtful. Sir Benjamin Baker in 1884 stated that "the factor of safety of 4 will be obtained as regards all shearing, tensile, and compressive stresses to which the masonry may be conceived to be liable under any reasonable hypothesis which can be framed." Doubtless the circumstances of the Niagara masonry suspension towers are quite outside any reasonable hypothesis conceived at the time by Sir Benjamin Baker, because (1) the climatic extremes were abnormal, (2) the suspension bending stress due to contraction and expansion of over 2 in. horizontal in winter, and (3) the railway line load stresses on a suspension structure induce bending moments. To these should be added the rigidity of massive country rock foundation, which intensified the stresses, and the height of the masonry was above average. However since the load was 36 tons per foot of cross-section and the compressive resistance of compact limestone is usually given at 500 tons per square foot, then $500/36 = 14$ nearly as the factor of safety taken by the builders of these masonry towers. On the other hand, Prof. Unwin recommends 20 as the factor of safety for dead loads and 30 for live. Stoney suggests 20 for arches for dead load. Prof. Rankine names 10 for dead loads under various conditions. It is not surprising that authorities should differ so widely in this important matter, for each had in view at the time a particular range of conditions which was intended to be covered by the factor of safety which they respectively recommended.

There is individuality with practitioners in all branches, each for a special reason adopting his own method in matters of detail. Some architects and engineers adopt bond blocks in brick piers, which are well loaded, with the view of equalising the stresses and rendering the pier more homogeneous. Other architects again will prefer to trust to the bond of the brickwork, as they consider that the bond stones throw all the load upon the shell of the face, because of the difficulty found in obtaining sound bedding of the block in its centre area upon the brickwork. It may here be noted that there would be the same objection to having a template and base block upon the top and bottom of the pier to receive its load. These latter blocks cannot well be dispensed with, and the bedding has to be relied upon for transferring and distributing the load stresses. Of course, it has been found in many instances that stone blocks of an area of, say, 5 ft. or 6 ft. superficial in the bed requires careful bedding to have it solid throughout its centre. In many cases grouting is resorted to for filling up not only bed-joints, but for bonding work together with cement. If the grout has sand in its composition, the sand and the cement having different specific gravities, the heavier (sand) will naturally be most in the lower levels, while the lighter cement will be in excess in the upper levels.

In abutments for arches and retaining walls there is always a varyingly large proportion of horizontal component in the thrusts. In the case of the abutment the amount of the horizontal component is increased as the arch is flattened. Abutments in some cases act also as retaining walls, having horizontal components acting in opposition to those of the arch. Such cases occur in ravines, cuttings, high river banks, and such like positions. The theories respecting the stresses in arches are various, according to the assumptions made by the investigators, each of whom believes that his method frees the problems from indeterminate results. Unfortunately some of these theories differ seriously from each other. There is a similar diversity of theories respecting the stresses in retaining walls. All rules for the solution of the problems for obtaining the direction and intensity of the masonry stresses encountered by retaining walls rely on certain foundamental principles and assumptions respecting the action of the earth at the back: (1) as to the nature of the surface of earth rupture; (2) as to the concentrated point of application of the earth force; (3) as to the direction which the earth pressure assumes. All earth or soil differs more or less from any generally assumed convenient classification, and they also differ in condition, and the condition varies according to season and the effects of the weather, recent and present.

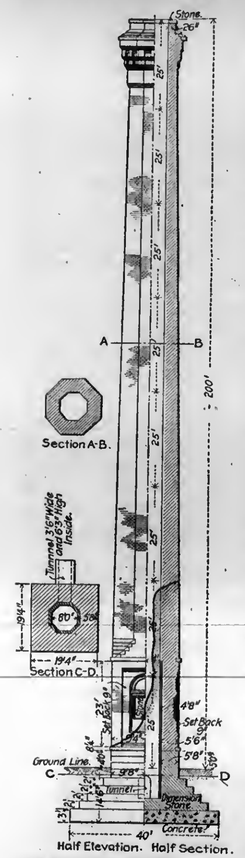
ITALIAN BRICKWORK.

Italian bricks are by no means of very fine quality save where moulded bricks are used, but the Italian architects, says the British Clayworker, differ from others in the extent to which they made use of stone intermixed with the brickwork of their buildings. The arrangement refers not only to the occasional introduction of stone voussoirs in the arches, but to the commonly recurring system of horizontal courses of stone alternating with courses of brick in the walling. Sometimes this is regularly carried all over a wall, sometimes only a course of stone is introduced here and there to mark some line or feature which appeared to require considerable emphasis. Sometimes again, as in the Romanesque apses of San Fermo Maggiore, Verona, a single course of brick is introduced between all the courses of stone, and the effect of this is delicate and good. The same church contains many examples of very ingenious mixture of stone and brick, and, on the whole, few examples are altogether more valuable. Sometimes we find, as in a wall in San Stefano, Bologna, the wall diapered regularly in brick. Here the diaper is made with thin red bricks arranged in diagonal lines all over its surface, the squares contained within them being all of yellow brick. This kind of work is never pleasant, save for the filling in of a spandrel, or some such place where no strength is required. It gives, of course, the impression of being a veil to the wall and not the wall itself.

COLLAPSE OF A CHIMNEY AT HAMILTON, ONT.

At one o'clock on the morning of the 19th of April a brick chimney 200 feet in height, constructed at Hamilton, Ont., for the Hoefner Refining Co., collapsed. The structure had only been completed on the afternoon of the previous day. We reproduce from the Engineering Record the accompanying illustration and particulars of the chimney, and the circumstances under which the accident occurred :

A sectional elevation of the chimney is given in an accompanying drawing, from which it may be noted it was a single shaft resting on a stone masonry foundation on concrete. It rose to a height of 200 feet, and the cross-section of its flue was apparently a regular octagon, the diameter of the inscribed circle being 8 feet. The brickwork varied from 5 feet 6 inches in thickness at the base to 26 inches at the top. There were no offsets on the inside of the shafts, as are common in such structures. The tunnel connecting with the chimney flue, it will be noticed, entered through the footing, on top of the two lower courses.



CHIMNEY FAILURE, HAMILTON, ONT.

The ground on which the stack stood is blue clay. Beach sand was used in the outside masonry and the sand for the inside was taken from a building site in the city which had been pronounced good. In the cold weather the mortar was used hot. It is stated that when the stack was up about 170 feet, it showed signs of crushing on all four sides, just above the stonework, bricks chipping off in many places. Attention was drawn to the circumstance at the time, but the chimney was completed, with the result that when the 30 feet were added the collapse came. The chimney fell in a direction north by east, and on the same side as the tunnel. The ragged line across the drawing near the base of the chimney shows the stump left standing, which has several fissures or cracks running diagonally across it as much as an inch wide.

A calculation was made to determine the probable static unit stress of the brickwork on the bearing area of the stone masonry, where, it will be remembered, signs of crushing were observed. Assuming the chimney to be square on the outside for 25 feet of its height, or from the 5-foot elevation to the 30-foot elevation, and to be the frustrum of a pyramid from this level to its top, the cubical contents, subtracting the 195-foot octagonal flue space, were found to be about 36,500 cubic feet. The brick masonry was assumed to weigh 125 pounds per cubic foot, so that the total weight of the brickwork would amount to 2,285 tons. The bearing area being 308 square feet, the pressure per square foot due to the dead weight would, therefore, be 7.4 tons.

Later information states that several large stones were found embedded in the first or lower 25 feet of the shaft, where the wall was 5 feet 6 inches thick ; and all along the line where the shaft slid off, these stones were exposed to view. The contractor claims he was instructed to put the stones in, while the architect charges the contractor with this construction. Some of ot the stones came to within four inches of the outside face and were irregular in shape and as much as 1 foot 11 inches in depth. A first-class brick was used in ordinary lime mortar. At the time of the accident a slight southerly wind was blowing.

In reply to enquiries we are informed that the chimney is being rebuilt by the same contractor, under an inspector, but we have not learned who is to bear the loss resulting from the accident.

CONCRETE FLOOR CONSTRUCTION.

Rules for concrete floor construction were recently given by Mr. Frank Caws, in a paper in the Journal of the Royal Institute of British Architects, as follows :

1. To take pains to obtain old cement. 2. To use good broken-brick aggregate, and not sand, in the proportion of four of brick to one of cement for the body of the slab, and fine crushed granite without sand for the surface coating, having about three of granite to one of cement. (I may say I have found that when the surface coat is gauged two of granite to one of cement, it sets too soon, while the continued expansion of the body beneath is still going on, and this causes minute cracks, tending to deface and spoil the surface.) 3. To adopt, as precautionary provision, sheep-wire netting as the base, and steel angle or tee bars weighing not more than 1½ pounds per lineal foot, spaced about 3 feet apart on the netting. 4. To consider a slab 10 feet square by 4 inches thick as capable of sustaining a load of 9 hundred-weight per foot, including its own weight, and to reckon that every slab will bear per square foot more or less than 9 hundred-weight directly in proportion to the square of its thickness, and inversely in proportion to the cube of its span. When the slab is rectangular the minimum span has to be considered the span. 5. To avoid casting slabs in frosty weather. 6. To insist upon organizing the gangs of workmen so as to cast as large an area of slabs as possible in one heat, and never to allow a slab to be left over night with its area only partially cast. 7. To insist upon strong centering, and to keep it all standing not less than five weeks after the last slab of the series of one flat is cast, and absolutely to forbid and prevent the sudden and careless removal of the centering.

PROPOSED NEW CEMENT MANUFACTURING COMPANY.

A public meeting of the citizens of the town of Durham, Ont., was held recently to consider what steps should be taken to establish there a Portland cement manufactory. It was stated that the conditions were most favorable, an abundant supply of the required mud and clay being available, with excellent shipping facilities. The following gentlemen were appointed a committee to secure a charter for a joint stock company to carry out the project : Messrs. Neil McKechnie, Gilbert McKechnie, Wm. Laidlaw, Chas. McKinnon, Charter Smith and Dr. Jamieson.

THE STRENGTH OF GLASS.

By C. H. C. Wright, B.A. Sc.

The following experiments were performed in the laboratories of the School of Practical Science under the direction of Principal Galbraith. The results are republished by permission from the Transactions of the Engineering Society of the School.

One of the lower sashes was taken out of a western window of the assembly hall of the school (top floor) and its single light of glass loaded and broken as indicated below. The glass had been exposed to the action of the weather for the past ten years, was well bedded, and the putty was quite sound and hard.

The sash was placed with its weather side up on a carefully prepared box 8 inches high laid horizontally. Sides 12 inches high fastened well together were placed on top of the sash and then paper scales divided into half inches were pasted on each side. Light graduated pointers with their cardboard bases were placed on the surface of the glass. The whole made an arrangement as indicated in the accompanyiny sketch.

Portland cement was then sifted very gently over the surface of the glass care being taken to keep it of uniform depth, for which purpose the graduated pointers and scales already mentioned answered admirably.

The glass measured 36 inches by 36.75 inches and a bag of cement (88 lbs. net) was sifted over its surface, then a barrel (347 lbs.) was gradually added, this was followed by a box of cement of 78 lbs., this by a second of 54.5 lbs., and finally a layer of bricks of 88.5 lbs. was added to the superimposed load. The failure occurred while the second lot of bricks were being weighed.

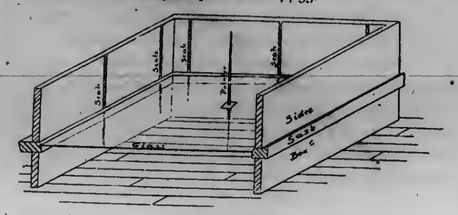
The deflection was approximately 7 / 16 inches under a load of 420 lbs.

After the experiment the cement was passed through a sieve, the pieces of glass were collected and weighed, and from their appearance the glass was what is known to the trade as 26 oz. It was certainly thicker than double diamond and not so heavy as 32 oz.

A sheet of double diamond was next placed in the sash but was not bedded nor puttied, and the load applied as before. This was followed by sheets of 16 oz. and 32 oz. weight respectively.

OLD WINDOW.

With glass probably 26 oz.
Size of glass—36 inces by 36.75 inches.
Weight of glass—15 lbs.
Failed under a uniformly distributed load of—656 + 15 = 671 lbs.
Pressure in pounds per square foot—74.55.



DOUBLE DIAMOND.

Size of glass—36 inches by 36.75 inches.
Weight of glass—13.5 lbs.
Failed under a uniformly distributed load of—262 + 13.5 = 275.5 lbs.
N. B. This sheet of glass in its unstrained condition was badly warped.

16 OZ. GLASS.

Size of glass—36 inches by 36.75 inches.
Weight of glass—10 lbs.
Failed under a uniformly distributed load of 322 + 10 = 332.
Pressure in pounds per square foot—37.

32 OZ. GLASS.

Size of glass—36 inches by 36.75 inches.
Weight of glass—17 lbs.
Failed under a uniformly distributed load of 611.5 + 17 = 628.5 lbs.
Pressure in pounds per square foot—69.8.

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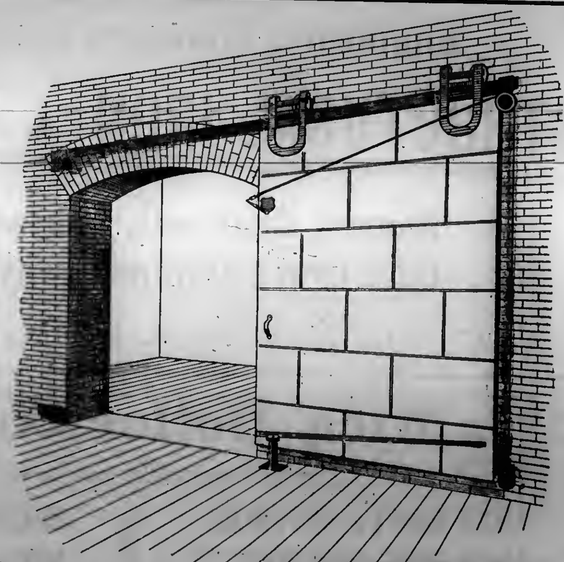
AGENTS FOR CANADA

NOVEL METHOD OF SHORING.

An interesting method of supporting a building while the foundations of an adjoining structure were being laid was recently illustrated in Chicago. An eight-storey building was about to be erected for light manufacturing purposes, the structure being L shaped, and designed to occupy, with the exception of a plot 50 x 80 feet, upon which stood an old three-storey building, the entire area of a lot 150 x 100 feet. The owner of the old building refused to make any agreement for a party wall, and the only alternative left by custom was to support it either by cantilevers or caissons, while the piles were driven for the foundation of the new structure. For various reasons the architect decided to support the adjoining walls of the building on beams resting on bearings which would be 10 feet from the trench where the piles were to be driven. The foundation of the new building contained some 400 piles, 100 of which were driven in a double row around the two adjoining walls of the old building. The walls were cut off below the first floor and supported at intervals of 6 feet on three 20-inch steel beams, resting on bearings 10 feet from the trench. The work was commenced by digging a trench about 6 feet below the basement of the old building, in order to eliminate vibration, then the piles were driven, the first row being within four inches of the wall, and so close that the hammer of the driver at times scraped the bricks of the old wall. Readings were frequently taken, but at no point was the displacement of the building greater than ¼ inch. It is stated that this is the first time this method has ever been used in Chicago under such circumstances.



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MANUFACTURES AND MATERIALS

PUMICE BRICKS.

For many years a brick made chiefly of pumice, in small pieces cemented together, has been in use in that part of Germany bordering the Rhine, and it appears that it has now found its way to England. The pumice is the product of some ancient Tertiary volcanoes, situated near Andermach and the Laacher See. The sections, as seen in the various pits, show the pumice to be in pieces, varying in size from mere grains to lumps some four inches across. It occurs in layers, but is frequently interrupted by small cuticular patches of more solid fragments of lava. The bricks are made from screened pumice, the larger pieces being broken to pass through a sieve having about ½ inch meshes. These screened pieces are then covered by a thin coating of cement, and the brick is moulded. It will be observed that the cement is not mixed with the pumice so as to form solid cement blocks, but by the fragments being coated first; the brick is obtained by these coatings adhering to one another. The result is a very light and viscular brick. Although used largely, even for exterior walls, in Germany, it is not very strong. These bricks seem specially adapted for light partition walls, for which purposes they are now being used.

PECULIARITIES OF CEMENT.

The annual report of Mr. A. W. Dow, inspector of asphalts and cements, to Captain Lansing H. Beach, Engineer Commissioner of the District of Columbia, refers to tests now in progress at Washington to discover the reasons of what might be termed abnormal behavior of cement. The points under investigation are: (1) The great strength obtained by some samples of Portland cement. That is to say, a certain brand of Portland cement will be running quite uniformly, the seven-day neat tests will average about 600 lb., and the seven day tests with one of cement to three of sand will average 250 lb. Then a carload will be received that will pull over 1,000 lb, for the seven day neat, and over 500 lb., when mixed with sand. The data for the investigation of this point are very meagre as yet. Such cements do not show any weakening with age and appear sound in every respect. On chemical analysis they are found to run 1 to 2 per cent higher in lime than the average of the same brand, while in all other respects they are about the same. They differ so little in the ordinary chemical analysis from normal cement that it is considered evident their normal strength is due not to the quantity of the ingredients, but as to how they are combined. (2) A shipment of natural cement is received at time which, in testing, passes the requirements of the one-day test, but after being in water for a few days the pats and briquettes, both neat and with sand, begin swelling and cracking. This disintregation

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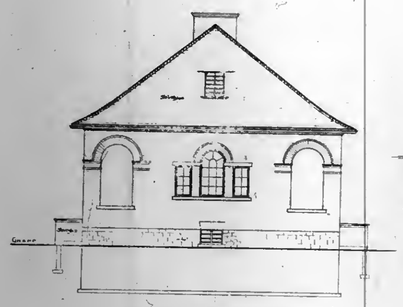
SUBMITTED IN COMPETITION BY

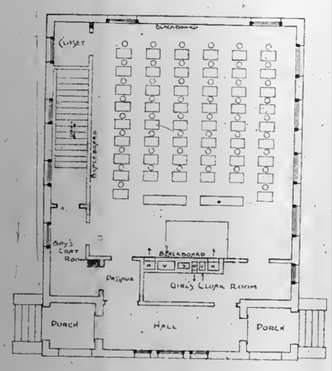
"DUO"

Scale - ⅛in. = 1ft. January, 1900.

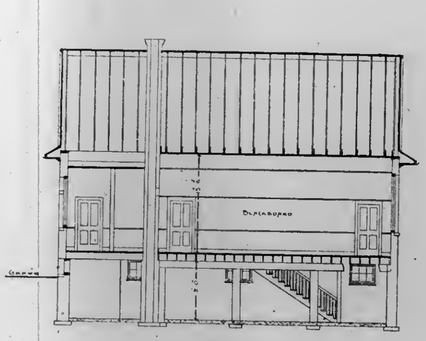


FRONT ELEVATION

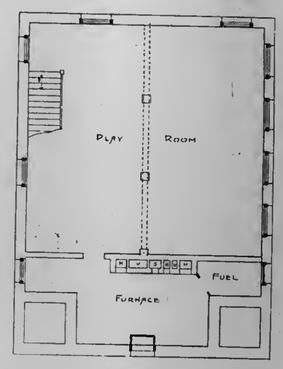
SIDE ELEVATION



GROUND FLOOR



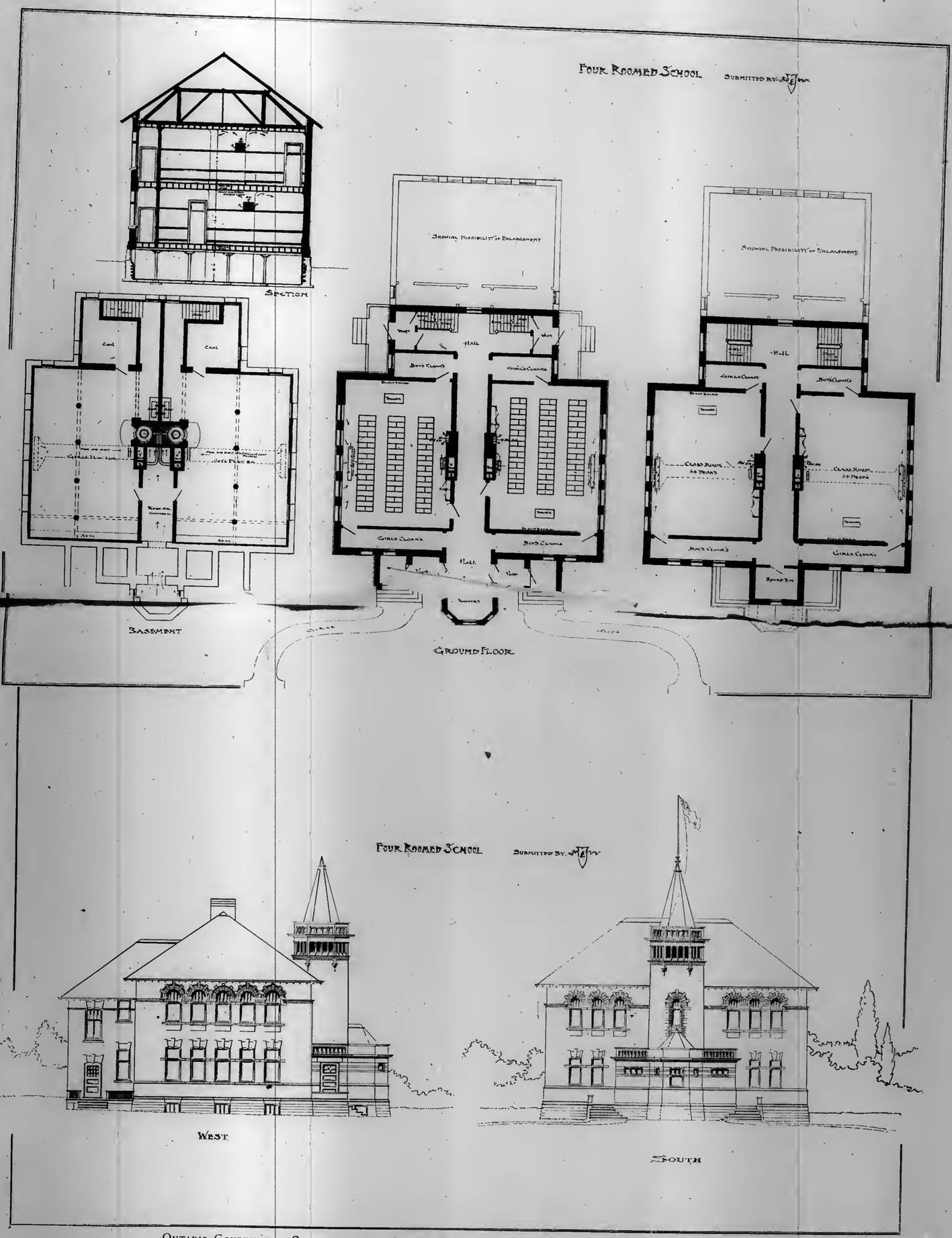
SECTION



BASEMENT

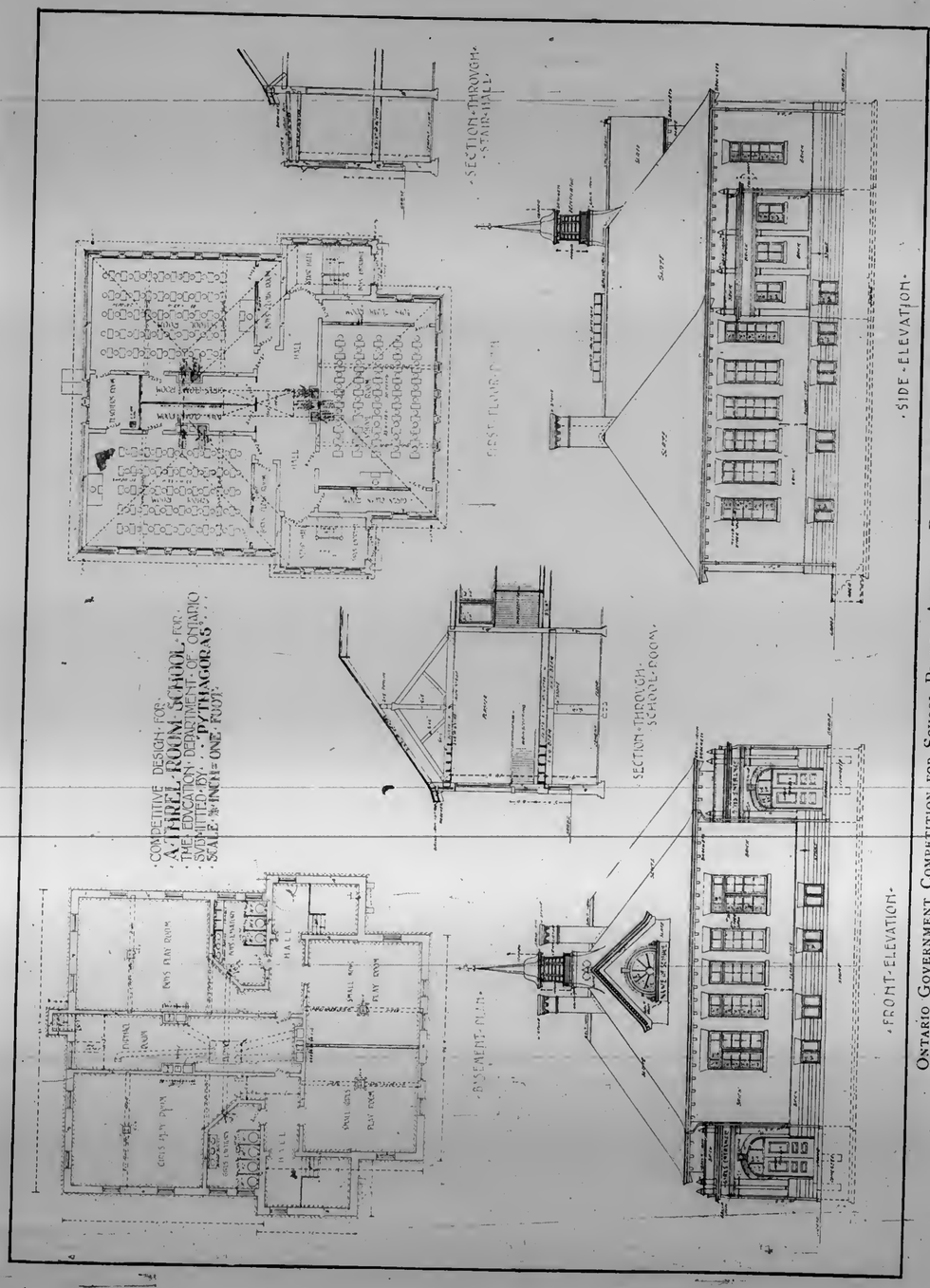
ONTARIO GOVERNMENT COMPETITION FOR SCHOOL PLANS.—ACCEPTED DESIGN FOR ONE ROOMED SCHOOL.

MR. HARKNESS, ARCHITECT.



ONTARIO GOVERNMENT COMPETITION FOR SCHOOL PLANS.—ACCEPTED DESIGN FOR FOUR ROOMED SCHOOL.
J. FRANCIS BROWN, ARCHITECT.

THIS PAGE RESERVED EVERY MONTH FOR WORK DONE BY MEMBERS OF THE ARCHITECTURAL EIGHTEEN CLUB, TORONTO.

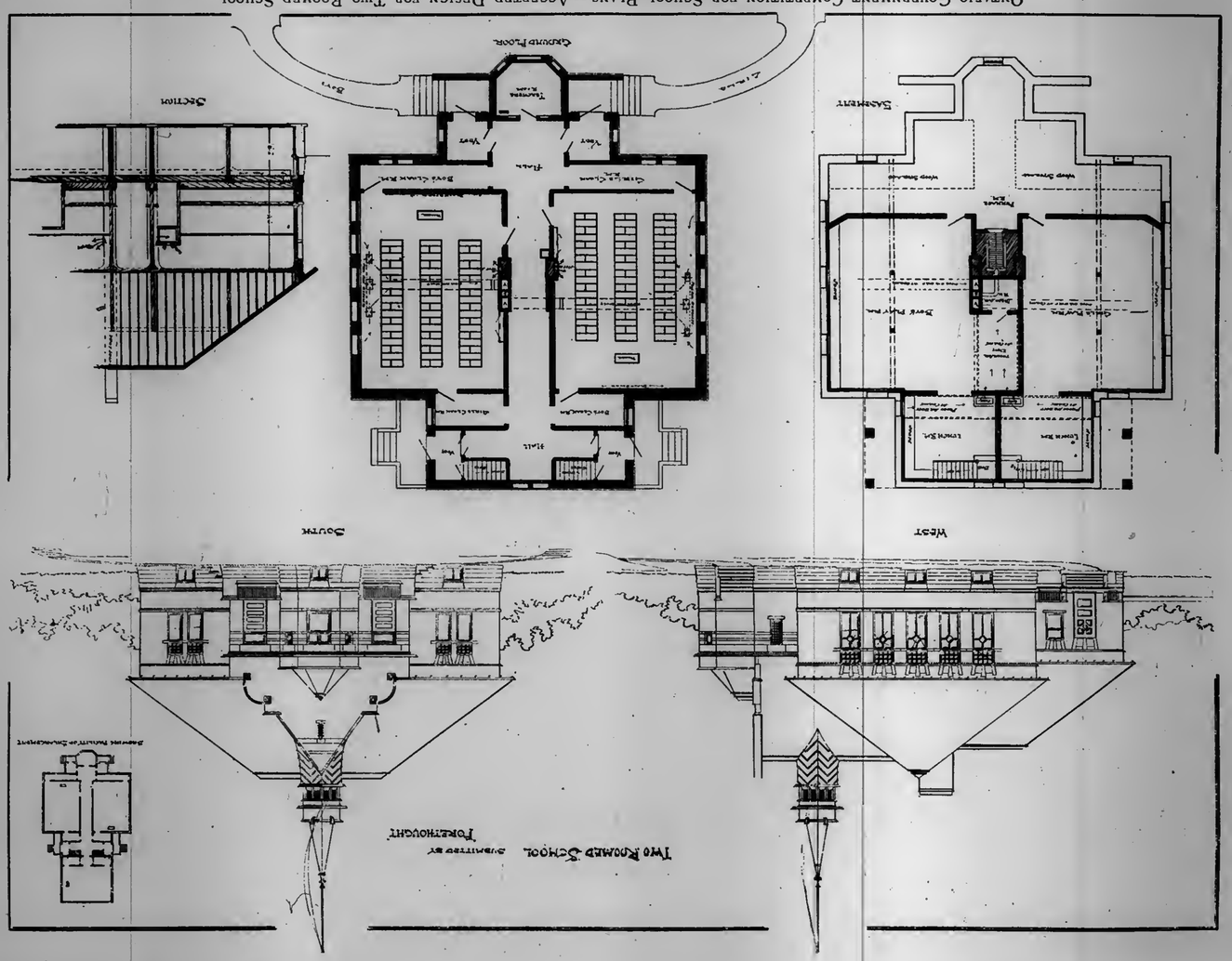


ONTARIO GOVERNMENT COMPETITION FOR SCHOOL PLANS.—ACCEPTED DESIGN FOR THREE ROOMED SCHOOL.

H. C. MCBRIDE, ARCHITECT.

Ontario Government Competition for School Plans.—Accepted Design for Two Roomed School.

J. Francis Brown, Architect.



CANADIAN ARCHITECT AND BUILDER.

VOL. XIII.—No. 7. • JULY, 1900 { PRICE 20 CENTS. $2.00 PER YEAR.

—THE—

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The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to foreign subscribers is $2.50. Subscriptions are payable in advance. The Journal will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrears of subscription paid.

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The Manufacture of Portland Cement.

A number of new companies are being organized in Ontario to manufacture Portland cement. Investigation has shown that an abundant supply of the raw materials necessary for the purpose is to be found in various localities. Upwards of half the cement at present used in Canada, amounting to perhaps a quarter of a million barrels, is imported from Europe, so that there is room for a considerable expansion of the native industry. Care should be taken however not to increase too rapidly our manufacturing capacity lest we find ourselves in the position of producing more than we can find a profitable market for. This has been the experience in many lines of industry. As soon as it became apparent that money was being made by the pioneer manufacturers in a certain line, others crowded in to such an extent that soon there was overproduction and little or no return to those who had embarked their capital. Then followed trusts for the purpose of limiting the output and maintaining prices.

Ancient Lights.

SEVERAL ably written papers have recently been presented and fully discussed before the Royal Institute of British Architects, showing the unjust bearing of the English law relating to ancient lights. It was pointed out that the strict rights of light given by the Prescription Act are often very injurious to the development of towns, and as matters now stand an unscrupulous person has an opportunity of preventing his neighbor from using his property to the best advantage, except by payment of large compensation, and the law affords no means other than by mutual agreement to alter

old lights in a way that might be beneficial alike to the owner of the dominant light and to the person erecting his new building. Too often such a state of things leads to what is nothing less than levying blackmail on the building owner, who must pay what is demanded or abandon his scheme. A resolution was adopted that the Council of the Institute should seek the co-operation of the Surveyors' Association for the purpose of securing, if possible, needed amendments to the law.

Schoolroom Decoration in Ontario.

Under this title a pamphlet has recently been published by J. George Hodgins, M.A., L.L.D., Librarian and Historiographer of the Education Department of Ontario, with the sanction of the Minister of Education and the Premier of Ontario. The pamphlet is somewhat disappointing, consisting as it does chiefly of extracts on the subject of school room decoration and art in the school room from various writers and publications. The original matter comprises an introductory chapter in which the author states his belief that the exodus of boys from the country to the cities and towns is largely due to the fact there is so little that is attractive in rural schools and homes. The American practice of decorating school rooms with lithographs, prints, and photographs designed to emphasize momentous and memorable events in National History, is referred to and recommended for adoption in Canada, and the suggestion is made that the Historical Societies should interest themselves in this work. It is also pointed out that the placing of good pictures on the walls of school rooms must have an educative and beneficial effect upon the homes of the pupils. The pamphlet contains a number of illustrations of historical scenes and personages, public monuments, etc., in Canada. The book does not treat of decoration apart from pictures, and, strange to say, makes no mention of the work of the School Art Leagues, of which a score or more exist in the city of Toronto alone, and which seem destined to be organized and perform a useful work throughout the province.

School of Practical Science.

The building occupied by the School of Practical Science, Toronto, has become too small to meet the requirements of this growing institution. Every room in the building, even the storerooms, has been brought into requisition within the last two or three years, and the limit has now been reached. It has been necessary to use the hallways as draughting-rooms, and to divide up classes, thus occupying the time of two or three instructors when one would be sufficient were class rooms of proper size available. It has been suggested that, inasmuch as the Department of Applied Science and Mineralogy is complete in itself, having its own staff, suitable accommodation should be provided for it in a new building. The space which would then become available for the other departments in the present building would properly fulfil all requirements for the next twelve or fifteen years. In connection with the proposed new building, accommodation should be provided for instruction in geology of students taking the Arts Course at the University. The proposal has been made that a portion of the ground and first floors in the front of this new building should be fitted up in a manner suitable for a Museum to receive the mineral exhibits which are now distributed between the School of Practical Science, the University and the Parliament Buildings. On account of the manner in which these exhibits are now divided up, they are of little service to the public. In all probability, when the Technical School Board shall have decided upon a new location, the building now occupied by the School will be taken down and a new structure erected suited to the above mentioned purposes.

The Evils of Unionism.

The benefits which should have accrued to all classes of the community from the return of commercial prosperity, have been greatly restricted by numerous strikes, consequent upon the unreasonable demands of the labor unions. As usual the building industry has been a severe sufferer from these disputes. Every year the demands of the unions are becoming more excessive and tyrannical and a more alarming cause of uncertainty and disturbance to trade conditions. A constant effort is being made to reduce the hours of labor and raise the standard of wages. The greatest pay for the least work, seems to be the object aimed at. To the employer this means a constant increase in cost of production, without any compensating advantage in the way of improved workmanship, for no attempt whatever is made to establish a standard of quality for union labor. Any workman who has the wherewithal to pay his fee is admitted to membership. No proof of his ability as a workman is demanded. Unionism seeks to place all workmen irrespective of ability on the same level, by demanding that all shall be paid the same rate of wages. No incentive is given members of the union to become superior workmen, but on the contrary the system tends to discourage ambition. The leaders of organized labor are apparently too busily employed in exercising their power in municipal, provincial and federal politics, to give attention to what should be one of the most important functions of such an organization — the elevation of the standard of workmanship. The evils of the union system have reached an acute stage, and the commercial world is looking about for a remedy. Legislation has been enacted in New Zealand which forbids under penalty strikes and lockouts pending the settlement of disputes. The Minister for Labor and Industry is given power to enquire into the cause of any dispute between an employer and his workmen, or between different bodies of workmen, and to endeavor to effect an amicable settlement of the differences, failing which he may direct a public enquiry by a judge of the Supreme or District Court, or by the president of the Land Court, who has power to enter upon the premises and inspect everything calculated to throw light upon the cause of the dispute except books or statements of account. On the application of both parties to the dispute an arbitrator may be appointed, and on the application of the parties a conciliator. No power is given for the enforcement of any decision arrived at. During the five years which have passed since this legislation was put into operation, New Zealand is said to have been free from strikes and lockouts with their attendant injury to commerce. The time has come when steps should be taken by means of legislation or otherwise to put a stop to the interference to trade and national prosperity as well as the hardships imposed upon individuals and families by labor strikes. If relief cannot be had in the form of legislation, then the evils of unionism must be brought to an end by a general union of employers to embrace all branches of industry, such as is being organized in Germany. Its programme is interesting and seems somewhat drastic. It is intended that when labor troubles break out in any one branch, delegates from all the branches of the union shall meet to consider the question of joint action. A fund for the assistance of weak employers in cases of strikes or lockouts is to be created, and a register of workmen is to be drawn up with the view of preventing strikers from obtaining employment elsewhere, while the men who made themselves particularly obnoxious are not to be employed in in any case. The union also intends to put up several candidates for the Reichstag at the next elections. The effect of a perfectly organized and determined opposition on the part of employers to the unreasonable demands of the unions is to be seen in the outcome of the recent engineers' strike in Great Britain. In that conflict unionism suffered a defeat from which it will never recover, and the employers regained control of the management of their own business which had to a large extent been usurped by the labor organizations. The conciliation Bill, introduced by the Postmaster General and which has just been adopted by the Dominion parliament is based upon the English act. It provides means for the settlement of disputes between employers and employees where both parties are willing to submit the matter to arbitration. The act is a purely permissive one, and differs in this respect from the New Zealand law.

Tests of Canadian Timber.

In view of the value which has been placed by the public upon the timber tests conducted by the Forestry Department of the American Government at Washington, the Government of Ontario has made a small grant to defray the cost of preliminary tests of Canadian pine. If the results of these preliminary tests shall be of a character to warrant further expenditure and investigation along this line the necessary funds for the purpose will no doubt be forthcoming. Up to the present time, the only tests made in Ontario of Canadian timbers have been conducted at the school of Practical Science, Toronto, with material obtained from the wholesale lumber yards. There was no data available to show where the timber was grown or the conditions of growth. It is now proposed to take a further step, by selecting the timber for the tests and carefully noting the conditions of growth. For this object, Mr. J. A. Duff, of the school of Practical Science, Toronto, will spend several months of the present summer in Algonquin Park, which, as our readers are aware, is a timber reserve under the control of the Provincial Government. Mr. Duff will make a selection of trees of various sizes and grown under varying conditions. These will be marked and the conditions of growth noted, so that when the tests are made not only the age and condition of the tree will be known, but also to what part of the tree the pieces tested belonged. It is hoped that tests made under these conditions will reveal such distinguishing characteristics of growth as will enable the architect, engineer, and builder to pronounce upon the qualities of timber which they are called upon to use. Whether or not this most valuable result will be achieved cannot be known until the tests shall have taken place.

Mr. Duff conducted a series of tests at the School of Science last winter to determine the strength of small pieces of white pine. The object of using small pieces was to enable users of timber for constructional purposes to make their own tests without the use of testing appliances. One important result of these tests was the discovery that invariably the character of the fracture of a good piece of timber differed entirely from that of a poor piece, and that each quality always showed the same kind of fracture. The timber of good quality showed a "bushy" fracture, while the stick of poor quality broke straight across and showed a single large diagonal split. The pieces tested were about 4 feet in length and $2\frac{1}{2}'' \times 1\frac{1}{2}''$ in diameter. It is proposed to begin next winter the more important tests above referred to. They will be carried on in connection with the fourth year work of the students of the School of Practical Science, and the results will be looked for with much interest by architects, engineers, builders, and others interested in works of construction. A room is now being fitted up in the school in which to note the effects of dead loads upon various materials. These materials will be loaded to a point near to the breaking strain, and will then be allowed to stand thus loaded for a length of time in order that the effect be noted.

ILLUSTRATIONS.

SOME HOUSES IN TORONTO.—EDEN SMITH, ARCHITECT.

NURSE'S HOME, GENERAT HOSPITAL, MONTREAL.—ANDREW T. TAYLOR, F.R.I.B.A., ARCHITECT.

NATIONAL TRUST COMPANY'S BUILDING, MAIN STREET, WINNIPEG, MAN.—GEO. W. GOUINLOCK, ARCHITECT.

RATING OF RADIATORS AND HEATING BOILERS.

Mr. D. M. Nesbitt, President of the Institution of Heating and Ventilating Engineers, in an address delivered to the members of that Society recently, said: "I think that I cannot do better than mention to you some of what I believe are apparent defects, as I see them, in our profession. Let us take radiators. I am sure many members here will endorse my remarks when I state that a radiator, which is a first-class article for steam, is often a very bad one for hot water, and vice versa. I know a case in the north of England where an architect, a friend of mine, who has just erected a public building in which the contracting, heating, and ventilating engineer allowed 10 square feet of heating surface per 1,000 cubic feet of space, but he could not get the building warmed satisfactorily. I am satisfied the radiator in this job is unsuitable for hot water circulation.

Again, I think we should insist upon manufacturers guaranteeing a certain amount of actual heating area in each section or loop, not merely mentioning a rating which is practically of no value to an engineer who has to give a guarantee to his client to perform certain work. This has been a vexed question for many years in the United States of America—the home of the "Radiator" trade—and many of the heating and ventilating engineers in that country have complained to me bitterly of the apparently false ratings of radiators in certain makers' catalogues. I think also that all radiators should be tested by an independent authority—indeed, by a specialist—under fixed conditions; that his decision should be final, and the heating trade should reject any radiators that do not bear such test or "Hall" mark. It is no more to ask for this test of radiators than it is to ask for a test with a girder, column, or high pressure boiler.

Similar remarks might be made about the various kinds of heating boilers that are placed before the engineering trades. Many of the boilers catalogued will not perform their duty up to anything like the figures which are stated."

It is proposed to reorganize with a competent staff of teachers, the art Students' League of Hamilton.

Mr. Duncan Ross, the well-known railway contractor, died a fortnight ago in the Western Hospital at Montreal as the result of an attack of pneumonia. The late Mr. Ross was a native of Nova Scotia and was 55 years of age.

WINNIPEG.

Expectations have not been quite realized as to the amount of building operations in progress up to the end of June, although the showing is satisfactory as far as it goes, evidencing the great faith of Eastern Canada and our own citizens in the stability and recuperating powers of this Great North West.

Building Inspector Rogers states in his report to June 25th that he has issued 239 permits representing $760,000 in value, an official declaration indicating the true state of affairs in the building trades as against the loose newspaper compilations of previous years. Assessment Commissioner Harris will find the data secured on these permits of immense service to him in his department.

By the appointment of Mr. Cambridge as city electrician, and inspector, a degree of safety in wiring has been secured, insuring as it does by thorough inspection a compliance with the city by-laws, and a uniformity of workmanship wholly lacking previous to the formation of this important branch in civic service.

The work of the City Engineer's department has been increasing largely in recent years; miles upon miles of streets have been macadamized, experiments in asphalt pavements made, granolithic sidewalks laid down, and a new waterworks system, with buildings and machinery nearly ready for operation, all executed under the skilled direction of Lt. Col. Ruttan. A special article in this connection is being prepared for a future issue of the CANADIAN ARCHITECT AND BUILDER.

Another old landmark is gone. The old Merchants' Bank building has been torn down by Contractor E. Cass to make way for a handsome structure to be built from the designs of Messrs. Taylor & Gordon, of Montreal, with Frank Peters in local charge.

The superior nature of the work in the two banks now nearing completion on Main street—the Dominion Bank and the Bank of Commerce—is making itself felt in labor circles, as well as upon the purses of owners who propose to build in their vicinity. First-class workmanship means money, and is the best kind of an investment after all, although the initial cost may be greater. The old Merchants' Bank was considered an ornament to the city, not so long ago either, a substantial building at that, but the progress inevitable to a flourishing financial institution demanded its destruction for a costly and more suitable up-to-date construction to take its place.

Darling & Pearson, of Toronto, the architects of the Dominion Bank and the Bank of Commerce, have got good value for the money expended upon the works, the latter presenting an artistically designed classic street elevation, one which will prove satisfactory even beside a building of greater height, so elegant are its proportions. The writer is an ardent Gothicist, but there are situations when admiration can be extended to a rival style. The Toronto architects have not been so happy in the architectural treatment accorded to the Dominion Bank corner, although it is a fine edifice with much detail worked in red terra-cotta to the street elevations. As this letter is but preliminary to further extended remarks on the more important buildings in the city and province, brief allusions must suffice for the present.

The walls of the Y. M. C. Association building, Geo. Browne, architect, are beginning to loom up on Portage avenue, and passers by are beginning to form some idea as to its size. Phil. Burnett is contractor for the masonwork, etc., John A. Girvin for the carpenter work and some other trades. Local brick and Indiana limestone are the materials selected for front elevations.

Brickmaking in Manitoba is still in its infancy. It will hardly be believed that if architects specify a bevelled plinth, or splay brick, the work has to be done by hand. A beaded or molded brick seems to be an impossibility, and the monotony in color is a great drawback to the artistic inspirations of the intelligent professional man who longs for what he cannot get. It is this desire for warmer tints on the part of owners and architects that has created so large an importation of bricks from the United States, and which has caused, what Ruskin hated intensely, the painting of so many buildings on our principal streets red. Not the Bacchus article, but prosaic every day paint. Eastern brickmakers, say in Ontario, could easily do a big business in this city and province provided they could induce the C. P. R. to lower their freights.

The partial failure of the wheat crop owing to the long continued drought has stopped some projected building enterprises, but the blessed rain has just come in time to relieve the minds of chronic grumblers, and even a total failure could not hinder the progress of Manitoba, however much its rapidity of development might be temporarily checked. That the local merchants and professional people of the province are full of faith is plainly evidenced by the numerous residences now in course of erection, particularly in Winnipeg, where almost every street with sewer and water connection shows more or less tasteful designs from the studios of Walter Chesterton, Hugh McCowan, Geo. Browne, F. Peters, C. H. Wheeler, H. Griffiths, S. Russell, Jas. Chisholm, J. Greenfield, and others, together with Mr. Shillinglaw, of Brandon, and Mr. Silverthorne, of Portage la Prairie.

Owners and architects here as elsewhere owe much to the honesty of the builders who undertake the responsibilities of construction; a straightforward contractor, one to be depended on, is a jewel of price. There are many such in this city, and the writer knows of a couple of dozen or so in the province whose word is their bond, and who can be trusted to do the right thing, even at a financial loss to themselves. These gentlemen are entitled to as much consideration as the professional man, especially in the CANADIAN ARCHITECT AND BUILDER, whose aim it is to bind closer the friendly ties between the professional and non-professional elements in the building trades. Reference will be made to our leading builders in future issues, and those departments essential to an up to date edifice—plumbing, painting, heating, etc.—with the principal men engaged in the sections just named.

The ruins of the Manitoba Hotel cast a dismal shadow over the trade prospects of South Main street which even the enlargement of that fine block known as the Hudson Bay stores cannot dispel. It is a dark cloud hanging around that end of the city with distastrous consequences to many of the stores in the immediate neighborhood.

North Main street, with its shacks and shanties, waxed jubilant over the announced commencement of the new C. P. R. hotel and station at the beginning of the season. The tenants on the purchased property had notice to clear out by May 1st, but they still hold their several forts or shacks, and the hotel scheme hangs fire. Considerable property changed hands, many sets of plans were drawn for new buildings, improvements were sketched out and were to have been promptly acted upon, when it gradually dawned upon the minds of the parties interested that nothing was apparently to be done this season, although it is not yet too late for the railway people to put in foundations.

By the time this correspondence gets into print His Excellency the Governor-General of Canada will have arrived in Winnipeg, the directors of the Winnipeg Industrial Exhibition having invited Her Majesty's representative to open the proceedings. He has graciously consented, and a very large influx of visitors is expected on Monday, July 23rd, to the end of the week. The directors have erected what is said to be the most commodious grand stand in Canada—size 150 feet long by 116 feet wide, with three 50-foot spans, and roof supported by Howe trusses, thus doing away with a multiplication of posts. Mr. Wheeler, architect; Mr. S. B. Ritchie, builder.

The science building in connection with the University of Manitoba is rising rapidly. Mr. Browne, architect; Mr. E. Cass, the masonry, and Mr. Mitchell, the carpentry and some other trades.

Labor troubles, thanks to the good sense of both sides, have been few this year; in any event arbitration can always be resorted to without an undue prolongation of strife.

Who will get the contract for the St. Andrew Rapids improvement for which tenders are being asked? Kelly Bros., of this city, know the ground well, and will doubtless stand a good chance to secure the plum. There is a revote of $125,000 for the work on account in the supplementary estimates at Ottawa.

Mr. Walter Chesterton is recounting a few reminiscences of his recent visit to London, England, and the great changes that have taken place in city and suburban architecture. He is particular in his admiration of the use of genuine stone and brick as against the stucco fronts which made so many residential streets hideously monotonous.

Mr. W. Brydon is one of the busiest men in the city. In addition to his own large building business he is official appraiser for the fire companies, and still finds time to act as chairman of the Works Committee of the Exhibition Board. Not by any means an ornamental position either.

CHAS. H. WHEELER.

The Art Museum of Toronto has been incorporated to promote the cultivation of fine and applied art. The following gentlemen compose the provisional Council: Messrs. G. W. Allan, James Bain, jr., G. A. Cox, F. Darling, R. Y. Ellis, J. W. Flavelle, E. W. Gurney, S. H. Janes, E. F. B. Johnston, James Loudon, Charles D. Massey, Jas. Mavor, J. P. Murray, Frederic Nicholls, E. B. Osler, G. A. Reid, B. E. Walker and D. R. Wilkie.

Branch Office of the CANADIAN ARCHITECT AND BUILDER, Imperial Building.

JULY 10th, 1900.

In walking through the city one is impressed with the fact that there are probably fewer buildings under construction at the present time than is usually the case at this time of the year. More especially is this to be noted in the case of residences as the high price of materials and a stiffening of the money market as regards loans has prevented the speculative builder from running riot. This condition of things will doubtless soon strike its own balance either in the lowering of prices for building materials or in the enhanced value of the present structures. The iron market has already weakened though the prices of all kinds of lumber appear to hold their own.

The railway companies with their increased earnings, are evidently able to look above and beyond such trivial matters as prices for they are certainly taking honors in the building line at the present time. Both the Grand Trunk and the Canadian Pacific are very busy, the former proceeding with their large office building facing on McGill street and taking in the block between William and St. Paul streets, giving a splendid light on all four sides. The basement and ground floor are of Staostead granite and are fine large blocks of good quality. The upper stories are of Indiana buff limestone and the whole structure will be fireproofed with porous terra cotta. This building when complete will enhance the general appearance of McGill street and when the old St. Ann's market is removed, property on this street should once more tend upwards. The Canadian Pacific are if anything busier than the Grand Trunk, as they have a large extension being erected to their Windsor street building as a large eight story office building on the corner of St. Francois Xavier and Hospital streets for the telegraph branch of the company's business.

The extension to their station is of similar design and material as the main building, and is to be fireproofed by Roebling Company's system of concrete. Mr. Edward Maxwell is the architect. The telegraph building is to be constructed of olive New Brunswick stone for the first two stories, the remainder being built of Scotch firebrick, similar to that used at the Chateau Frontenac at Quebec and the Place Viger Station in Montreal. The building, it is understood, is to be fireproofed throughout with the Expanded Metal Company's system of fireproofing. The building measures about 100 feet on St. Nicholas street and 45 feet on St. Francois Xavier street, with an entrance for the offices on Hospital street, while the entrance for the telegraph business will be on St. Francois Xavier street. The architects in charge of the work are Messrs. Hutchison & Wood.

On St. James street there is very little to report this year. The La Presse building is now complete; the "Star" building is nearly so and the tenants are in the Merchants bank building. This building has now grown from a 4 story building to one of double that capacity. The Molsons bank has extended its banking room to its line at the rear, but otherwise there is no new work on this street that has been started this spring. St. Catherine street does not seem to be much busier. Messrs. Henry Morgan & Company have erected a handsome extension to their large departmental store, and have already added a branch for paper hanging and decorating—the first wedge into the contracting business. Near the corner of Peel street the two stores east of Messrs. Tooke's block has been recently purchased by Mr. Inglis at $15 per foot, the highest price so far realized on this street. It is understood that Mr. Inglis intends erecting two handsome stores on this site next spring. There are at present 5 stores being erected on the north side of this street between Mountain and Drummond streets, for Mr. Pacaud under the supervision of Mr. Eric Mann.

In buildings for educational purposes McGill College heads the list, as she is adding to her medical building and rearranging this portion of the college, when it is expected McGill will have an opportunity to boast in having one of the best equipped medical colleges in America. Besides this work a large additional stack room is being built on the south side of the present library building. Mr. Andrew T. Taylor, of the firm of Taylor & Gordon, is the architect of both these structures. The Catholic School Commissioners have recently approved of the plans of Messrs. Perrault & Lesage for the St. Eusebe school, on condition that the entire cost, including site, construction and all contingent expenses, should not exceed $35,000.

As regards churches the Franciscans are proceeding with the erection of their church on Dorchester street, under the superintendence of Messrs. Resther & Sons, while the Roman Catholic residents of Westmount have decided that a church is needed in that locality, and intend to erect a church and presbytery at a cost of about $50,000. Melville Presbyterian church in Westmount has divided and the portion of the congregation who are to withdraw have decided to build a church capable of seating about 600 on the east side of Westmount park, at a probable cost of $12,000. Westminster Presbyterian church on Atwater avenue are completing their structure, of which a portion had been built for some years. There is also a Baptist church being erected in Point St. Charles from designs by Mr. A. T. Cooke. The addition in the form of a new chancel, etc., to St. James the Apostle church is now complete. The proportions of the new chancel are very pleasing, though the moulding of the chancel arches did not appear quite so happy. The large Roman Catholic church of St. Jean Baptiste is now nearing completion and the dome is standing in all the naked beauty of its iron frame.

The committee appointed by the City Council to look into the desirability of annexing some of the outlying municipalities has been holding several meetings. Replies have been received from some in regard to the amount of their debt and valuation roll. It is understood that Westmount has politely declined the invitation, but that both St. Henry and Outremont are in favor of being annexed. It will no doubt be of interest under this heading to give the sales of real estate in each of the city wards and then a few of the outlying municipalities for the past 5 months. They were as follows:

	Jan.	Feb.	March.	April.	May.
St. Antoine	$217,944	$170,425	$384,903	$466,593	$172,266
St. Ann's	32,712	2,005	7,951	16,843	49,750
St. James	126,915	53,038	66,078	95,240	154,281
St. Louis	74,642	21,200	73,207	40,547	34,746
St. Lawrence	55,551	133,815	40,511	40,566	75,667
St. Marys	28,500	89,511	55,714	60,961	41,728
St. Jean Baptiste	38,711	48,850	66,515	63,387	54,190
St. Denis	35,039	26,091	38,442	54,839	9,769
St. Gabriel	31,633	13,550	7,852	14,273	16,488
Hochelaga	7,813	11,999	2,550	25,628	8,358
West		7,600		275	45,300
Centre		50,000		40,000	
East					13,094
OUTLYING MUNICIPALITIES.					
Westmount	$109,414	$122,158	$167,759	$91,296	$66,112
St. Henry	20,212	33,309	55,271	12,226	19,930
Mile End	67,128	48,930	44,414	35,878	62,947
Maisonneuve	49,100	25,590	1,350	40,936	40,011
St. Cunegonde	15,350	2,187	11,970	14,102	13,009

There were some very successful meetings held in this city in the end of June, in connection with the annual convention of the Association of Master Plumbers. Delegates were present from nearly all the principal cities from Halifax to Vancouver, and all seemed to take a lively interest in the working of the association. The officers elected for the ensuing year were as follows: President, W. H. Meredith, Toronto; Vice-President, J. McKinley, Ottawa; Secretary, W. Mansell, Toronto; Treasurer, J. Lamarche, Montreal. The delegates expressed their appreciation of the kind reception they received from their fellow workers in this city as well as from the civic authorities. The meeting of the association next year will take place at Toronto.

In reference to the street railway continuing their line from Cote de Nieges road, through the property owned by the Seminary and the Trafalgar Institute, as far as St. George's Club House on the upper level of Westmount, the committee recently reported that the town of Westmount would be willing to concede a bonus

to the Montreal Street Railway Company on the following conditions, and that the whole is ratified by by-law :

"In consideration of the street railway continuing and extending their lines from the present terminus on Cote de Nieges Road, across the Seminary and Trafalgar Institute property, along Westmount Rd., Avenue and Boulevard, as far west as St. George's Club House. The town of Westmount will pay a bonus of one thousand dollars per annum for ten years, commencing from the day the cars run on said extension to St. George's Club House, subject to the following : 1. That the said extension to St. George's Club House be further extended and continued round the mountain and then easward to Westmount Road, so as to form a circuit of the mountain. 2. To construct a loop line to Sherbrooke St. from the Boulevard, via Argyle avenue or some other street parallel west of Argyle Ave., within the above mentioned three years. 3. To carry passengers to or from the city to any point on said above mentioned extension and loop line at single fare. 4. The cars on said extension or loop line to run at intervals of not more than ten minutes each way.

Mr. Justice Davidson recently gave judgment in a case between the Asbestos & Asbestic Co. and the William Sclater Co., Ltd., to enjoin them from using the word "Asbestic" or "Asbestic Wall Plaster," on the ground that it was an infringment of their trade mark. The Court held that the word Asbestic was of general use and that words used to describe an article were common property. The Court of the Queen's Bench (in appeal) has unanimously decided that a landlord who rents his houses to women of ill-repute is guilty in the same degree as the keeper herself and may be condemned to the same penalty as the principal. This judgment was given in a case which was initiated by the Recorder's Court.

Sir William McDonald, with his usual generosity, has offered to erect and endow a crematory for Montreal, and in order to have the best and latest ideas embodied in his scheme, he, together with Mr. Andrew T. Taylor, architect, visited Boston, where the most improved plant is to be seen. It is understood that plans are now under way and that this city will soon be numbered among those that can give an option on the manner in which the last rites to the dead are to be carried out. Sanitary and common sense reasons seem to point to cremation as the better method, though it will doubtless be many years before it will be used even by a majority of persons, and in this case it will probably be longer on account of the sentiment of an old custom lingering still more over the old ceremony.

During the months of May and June summer classes in drawing, modelling and painting, open to men and women students, were held in the rooms of the Architectural Department of McGill University under the direction of Mr. Henry F. Armstrong. Instruction was given daily, except Saturday, between the hours of 9 a.m. and 5 p.m., in addition to excursions for outdoor sketching. The courses of study embraced the following :

FREEHAND DRAWING IN LIGHT AND SHADE IN LEAD PENCIL AND CHARCOAL.—An Elementary Course, including, (1) the drawing of common objects, casts of ornament, architectural details, and studies embodying the principles of perspective—as preparatory to outdoor sketching, etc. ; (2) the drawing of plant life ; (3) outdoor sketching of landscape subjects in pencil. An Advanced Course, including, (1) the drawing of animals from casts in relief and in the round ; (2) the drawing of the human figure from casts of antique and other sculpture ; (3) studies in drapery; (4) drawing from the living human figure ; (5) weekly exercises in figure composition for those drawing from the living model.

PEN AND INK RENDERING AND BLACK AND WHITE WORK.

MODELLING.—An Elementary Course, including, (1) the modelling, from casts, of ornament in low relief and in high relief ; (2) casting in plaster of paris. An Advanced Course, including, (1) the modelling of animals from casts in relief and in the round ; (2) the modelling of drapery ; (3) the modelling of the human head and the human figure in low relief and in high relief from casts of antique and other sculpture ; (4) the modelling of the human head, torso, and complete figure in the round, from casts of antique and other sculpture ; (5) the modelling of the human head and figure from life ; (6) weekly exercises in sculpture composition for those studying the full figure from life.

PAINTING IN OILS AND WATER COLOR.—An Elementary Course, including, (1) studies in still life, or still objects, material, fruits, etc., in groups arranged as compositions in color and light and shade. (Mixture of colors, handling, technique, etc., taught in this section) ; (2) studies from plant life in bloom ; (3) indoor studies in landscape art as preliminary to outdoor work ; (4) outdoor sketching in water color and in oils. An Advanced Course in Oil Painting, (1) from the human head, the draped figure, and the full living model, as preparatory to portrait painting, pictorial compositions, and decorative painting ; (2) weekly home exercises in figure and color composition for those painting the full human figure.

VALUE OF HEMLOCK.

A FEW years ago hemlock lumber was regarded as of little value, but recently it has steadily gained in favor until its commercial value has almost reached that of white pine. The scarcity of white pine is in part responsible for the greater attention given to hemlock. It is quite remarkable that in the North-Western States the production of hemlock lumber increased during the year 1899 over 200,000,000 feet. This indicates that hemlock is gradually occupying a stronger position as a staple article. In Pennsylvania and the east hemlock has for some time been used for the cheaper classes of buildings, and now that it has come into more general use in the west, the question has arisen as to its value is relation to white pine. The opinion seems to be graining ground among the hemlock manufacturers that there is no reason why it should not command a price equally as high as white pine ; in fact, the North-Western Manufacturers' Association have established a list only $1.50 below the pine quotations. This, it might be said, is the highest relative price yet obtained for hemlock piece stuff.

What has been said regarding the hemlock of the United States is equally true of the Canadian product. There are, in Canada, two varieties of hemlock. The timber commonly known as hemlock is found more or less abundantly in the provinces of Ontario, Quebec, New Brunswick and Nova Scotia, while the western hemlock is common to British Columbia only. The quality of western hemlock is superior to the eastern article. It is likewise shown by tests that the hemlock of eastern Canada is of better quality than that of the United States. The specific gravity, elasticity, transverse strength, and resistance to indentation are higher in the Canadian article, while only in resistance to longitudinal compression is the United States article shown to be superior. It is also worthy of note that tests of hemlock show that material to be superior in some qualities to white pine, but, of course, it is generally inferior to that timber, and is not capable of taking as good finish.

There is, we believe, a promising future for the hemlock timber of Canada, and although it may never become as generally used as the white pine, its value will no doubt advance as the merits of the timber become more generally known.

The rules for heating of buildings are many and various but the following are given as having been found reliable in practice : Allow one-fourth square foot of radiating surface for each $\frac{1}{35}$ of the cubic contents for first floor rooms and halls ; the same amount of radiating surface for each $\frac{1}{45}$ of cubic contents of room for second and upper floor rooms, and one-fourth square foot of radiating surface for each square foot of glass surface plus that of exposed wall. Wolff gives the following allowance for special conditions : Increase ten per cent. for northerly exposures subject to wind, and ten per cent. when the building is heated during the day time only and when the building is not exposed. Increase 30 per cent. when the building is done in the day time only and when the building is much exposed. Increase 50 per cent. when the building is heated during winter months intermittently at long intervals. The above factors make a considerable modification and what factor to use in any given case is a matter of judgment based on experience.

BY THE WAY.

"I HAVE arrived at the conclusion, based upon a careful consideration of the subject, that the citizens of Toronto get value at the rate of only about 40 cents on the dollar for the money expended on so-called public improvements" remarked a prominent business man of Toronto to me recently. "For example" said he, "look at that piece of land on the water front, formerly occupied by the C.P.R. depot, and which cost the city a quarter of a million dollars. It was purchased for a public square, with the idea that it should be made an attractive spot which would enhance the appearance of the entrance to the city from the lake and afford a delightful breathing place to the citizens during the heat of summer. Instead of fulfilling these commendable purposes, for want of proper attention it has become a receptacle for old tin cans and such like refuse. The expenditure of half a million dollars on the so-called "Don improvement scheme," was entirely thrown away. The St. Lawrence market bungle affords another object lesson in the same direction, and the list might be indefinitely extended."

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WE have recently been asked says a writer in in the British Clayworker what terra alba is. It is one of those substances the history of the production of which is clear enough, but its history after that is particularly uncertain. It seems to be known only in England to a chosen few who take particular care to keep what they know about it to themselves. And they have every reason to do so, in most instances. Terra alba is ground gypsum. It is in at least two qualities depending upon the purpose for which it is required. The chosen few have learned a few wrinkles about it from Nova Scotia. It is some extent employed in making up cheap white pigments, where the purchaser in some instances imagines he has white lead. Now and then it may usurp the place which ought to be occupied by barite in paint manufacture. It is of very clinging nature and wherever the manufacturer has a mind to cause a substance to be rather more weighty than it ought to be he often looks toward terra alba. In short, it is commonly used as an adulterant for many purposes—far too numerous to specify. The substance is not injurious to health, unless the taker deliberately sets himself to feast on it. It cannot be classified as a plaster, for it is not calcined, and the prime qualification to be possessed by the gypsum from which it is made, is that the latter shall be as pure as can be. Of course, so far as its use in cheap paints is concerned, that is legitimate enough ; but of some of its other uses—well, we would rather not express an opinion. Somerset House might, however, do so, if it felt that way inclined.

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THE Executive of the Canadian Manufacturers' Association have been considering the question of the advisability of holding a Dominion Exhibition in Toronto next year. The opinion of the members of the Association has been asked as to whether the Association should go beyond this and make an exhibit at the Pan-American exhibition to be held in Buffalo. The consensus of opinion seems to be that, if the project for a Dominion Exhibition is gone on with, no attempt should be made to exhibit at Buffalo. This opinion seems well founded. If a Dominion exhibition is undertaken and carried out on a creditable scale, it will sufficiently tax the energies of the Association. It must also be borne in mind that the possibility of finding a market in the United States for Canadian manufactures is extremely small, seeing that the United have now an over-production in almost all lines of manufacture, and are looking for outlets in foreign markets for their surplus goods. I have felt for several years past that the holding of an Exhibition in Toronto, on such a scale as to attract visitors from all parts of the Dominion should be productive of much good, and if the attempt is to be made it might as well be next year as any other time. The Exhibition at Buffalo would not be likely to interfere with its success, but on the contrary might add to it, as some of the visitors to the larger exhibition might be disposed to visit Toronto also. Speaking generally, it would seem as though the Exhibition idea is likely to be carried to an extent which will eventually deprive it of any novelty or usefulness. I observe that on the heels of the Buffalo Exhibition is to come another one at St. Louis, preparations for which are already in progress. There is also to be one held next year in Glasgow. If Canada is to have an Exhibition on a national scale, it would be as well to launch the enterprise at once, so that we may not come in at the tail of the procession.

THE CANADIAN EXHIBIT AT THE IMPERIAL INSTITUTE.

THE resources of Canada, and particularly of the province of Ontario, are by no means properly or creditably represented by the exhibit at the Imperial Institute in London. The visitor would be much more favorably impressed if the exhibits of the various provinces were placed side by side, instead of on different floors. The present arrangement does not convey the idea that Canada is one Dominion, but rather that it consists of a number of separate provinces having little or no connection with each other. The exhibit should be arranged in compact form like that of Australia. As to the character of the exhibit, and more particularly that of the province of Ontario, the richest and most important of the provinces, there is good ground for complaint. One would suppose from the numerous views of Niagara Falls placed about the walls, that this great natural phenomenon was the one distinguishing characteristic of the province of Ontario, while the specimens of Indian work are well calculated to confirm the idea, already too prevalent in the minds of some of the people of Great Britain, that Canada is a wild and uncivilized country. Ontario is known on this side of the Atlantic as a fruit-growing province, and the quality of its production in this line is not excelled by that of any other country. In view of this fact, it is extremely humiliating to a Canadian to observe that the jars containing samples of Canadian fruit shown in this exhibit have apparently not been refilled during the last decade. What was once fruit might now, judging from appearance, be almost any other substance under the sun. There is also displayed a view of the Toronto Industrial Exhibition of date the year 1885, which, of course, conveys a totally inadequate idea of the character and extent of the Exhibition of to-day. We would suggest that all relics such as this and the photograph of the ruins of Fort Erie, might well be thrown out of the exhibit, and modern views of our principal cities and industries substituted, so that visitors would be given an approximately fair idea of the kind of country Canada is, the extent of its development, and its advantages as a place of residence and business enterprise. The Canadian Pacific Railway show some excellent views of harvesting in Manitoba. These are well calculated to make a favorable impression upon intending emigrants. There is also an excellent geological map of Ontario containing a large amount of information with regard to the population and resources of the province. There is a fairly good exhibit of building stones and marbles, also of hardwoods. Other features equally valuable might be added, so as to convey to visitors a proper idea of the country and its resources. The entire exhibit should either be rearranged, improved, and brought up-to-date, or be entirely done away with.

VENTILATION AND HEATING OF PUBLIC BUILDINGS.*

By P. H. Bryce, M. A., M. D.

In my addresses to you in the several past years, I have endeavoured to deal with some practical subject in public health work, which you as engineers and architects may be expected to have to deal with. We have drained the ground upon which we were going to build a house; we have carefully considered the source and means of preserving its drinking water in a wholesome condition, and have also set forth in some detail the several means which modern science has supplied for properly dealing with the excretal matters which, as sewage, require removal from such a human habitation.

To-day I propose to deal with another feature of the sanitation of this house, viz., that of the house-air and means whereby it may serve the requirements of health to its inmates.

It is safe to say that while there has been progress in the work of constructing buildings and in the mechanical appliances for heating them, and even ventilating them, in many individual instances during the past fifteen years, yet there is probably no branch of public health work which has shown so little progress in its systematic development in Ontario as of those methods of heating and ventilation, which even in the most general way, have official sanction and are governed by either legislative or municipal regulations. If one were to seek for an explanation of this it would probably be found: First, in the very nature of the problem. It must be remembered that the moment life in buildings with closed sides began in climates requiring artificial heat, ti became artificial. "The wind bloweth where it listeth" are the words of the Teacher, applicable to the free movements of the outer atmosphere only, and all attempts to confine air and heat necessarily cause a departure from nature's methods and convert the problem of supplying the dwellers in houses with fresh air into a question subject to the limitations of a secundam artem. A second reason is that from the very nature of the complex life of any population living in populous centres, there are not in Ontario as yet any regulations fixing in any definite way the size, mode of construction, or number of inmates of houses, except where it is stated under the Factory Act that—

Section 15.—(2) "A factory shall not be so overcrowded while work is being carried on therein as to be injurious to the health of the persons employed therein."

"(3) Every factory shall be ventilated in such a manner as to render harmless, so far as is reasonably practicable, all the gases, vapors, dust or other impurities generated in the course of the manufacturing process or handicraft carried on therein, that may be injurious to health."

As the Act states, however, these necessary and reasonable provisions shall not apply where persons are employed at home, that is to say to a private house, or a room or place which, though used as a dwelling, might by reason of the work carried on there be a factory within the meaning of the Act, and in which the only persons employed are members of the same family dwelling there.

It is further provided in the school regulations that public schoolrooms shall have an air space of not less than 250 feet per pupil, with a superficial area of at least 12 square feet, a uniform temperature of 67° F., and provision for a change of air three times every hour.

And a third reason is the lack of well-defined methods of ventilating public buildings, readily applicable to different buildings, arranged so as to secure at a moderate expense an adequate supply of fresh air in such a manner as to be free from draughts.

It will thus be seen that the problem of maintaining house air in a condition of purity necessary to make it in some degree comparable to that of the outside air is in practice a difficult one, judging from results; but nevertheless, when it is remembered that an adult man requires 3,000 cubic feet of fresh air per hour, introduced into his living room in order that such air may be maintained at a point where the carbonic acid produced by combustion in the lungs shall not exceed six parts in 10,000 of air, it is apparent that the evils due to lack of ventilation in private dwellings, public buildings and factories, are one of the most serious sanitary questions existing in our communities. The adoption of some artificial or mechanical means for the purpose of introducing fresh air into dwellings is commonly termed "ventiation," and depends upon some method whereby the air of a room may be removed and replaced by outside air, which, owing to its free movements, always maintains practically the same constitution. This is undersood when it is remembered that air moving at the rate of five miles an hour, or that of the gentlest breeze, will renew the air over a space of a foot square 26,400 times. In warm weather ventllation is easily possible by doors and windows, but in cold weather air must be introduced into rooms through ducts, having been previously warmed by a furnace.

From the standpoint of the public, there is no doubt that apart from a lack of knowledge of the directly injurious effects upon health of residence in badly ventilated houses, and of the existence of practical means of remedying the evil, the prime difficulty is that the individual recognizes by the eye no difference between the indoor nod the outdoor air. He can recognize closeness on coming into a foul atmospere from outer fresh air, but this closeness is looked upon as inevitable, and the deadened sense of smell soon fails to recognize the foul odors. Moreover, the methods of heating and constructing houses vary so greatly that badly distributed warmth in houses makes people more anxious to confine the heat produced than to introduce fresh air.

Amid the questions of economy to the householder, of the architects who are specially sought out because of their ability to give a fashionable outside to houses, of competition amongst the innumerable manufacturers of furnaces, boilers, grates and stoves, all of which are of course modelled upon the latest scientific principles, it may be well to recall some of the laws underlying what seems so simple, and yet proves to be one of the most difficult practical problems which sanitarians, architects, and engineers are called upon to deal with.

To maintain the human body in a state of health, it must not only be supplied with an amount of food requisite for supplying it with energy for work, but it must also consume an amount equal to the task of maintaining the body at a temperature of 98.4° F. As bodies lose their heat both by radiation and conduction, it is plain that non-conducting clothing plays an important part in preventing an undue loss of body heat; but common experience tells us that for persons employed at sedentary occupations in-doors, an air temperature of 60° to 70° F., is necessary to comfort and health. Further experience tells us that the air of the room must not be in too rapid movement, probably not more than a half-foot per second, and must further be, as nearly as possible, as warm near the floor as 6 feet above it. With the atmosphere in temperate climates ranging in winter from between 30° F. and—20° F., it is plain that the amount of heat required to keep the air of a house warm, will depend (a) upon the construction of the dwelling, (b) upon the number of renewals of air per hour, and (c) upon the character of the heating apparatus employed. As regards the construction of a house, it is necessary that the walls be made of materials which are poor conductors of heat, that they may be so built that moisture will not readily get into the interstices of the materials, as with soft brick, unpainted boards, and damp foundations; and that they will be so well built of close materials that air currents will not blow through them. How essential that building materials be poor conductors may be learnt from the notably different conductivities of different substances for heat. Thus, a wall of wood of equal thickness would be three times better as a non-conductor, than one of brick. It is of equal importance to remember that air confined in a close space is ten times as good a non-conductor as wood, hence the important part played by double windows, glass being ten times better as a non-conductor than wood.

As regards the required changes in the air of the room, it is plain that as this will depend on its size and the number of its inmates, the amount of air to be heated will be simply that required to supply the ideal 3,000 cubic feet per hour to each adult inmate; while the heating apparatus to be chosen will be that which most readily transfers its heat with the smallest loss to the air supplied to the dwelling. While it may be said that, in theoretically discussing ventilation, we need not regard by what method the air to be supplied to a room is heated, yet in practice, the question is a most important part of any system. When carbon or its compounds, whether as coal gas or wood is consumed, it produces heat by the union of carbon with oxygen, while hydrogen at the higher temperatures if present, unites with oxygen to form water vapor. In combustion every pound of carbon forms 3.7 lbs. of carbonic acid, and emits heat enough to raise the temperature of 87 lbs. of water from 62° to 212° F. and every pound of hydrogen produces 9 lbs. of water, and emits enough heat to raise 417 lbs. of water from 62° to 212° F. For the purpose of estimating the value of any fuel, it is most convenient to estimate the number of pounds of water which can be raised by any given weight of fuel; though 1° F. or from 32° to 33° F. which is termed a heat or thermal unit, and which is roughly applicable for every degree from 32° to 212° F. Experiment has shown that 1 lb. of carbon produces 13,000 units of heat and 1 lb. of hydrogen produces 62,500 units. What then is apparent is that economy in heating means that the largest possible number of units of this heat, in-

* Paper read before the Engineering Society of the School of Practical Science, Toronto, and reprinted by permission from the Transactions.

stead of being allowed to escape by the chimney, or other way, be transmitted directly or indirectly to the air of the rooms occupied; the air being in such a condition of purity and freedom from movements, and having such evenness of distribution, that a sense of comfort may be given to all the inmates.

The modes by which heat is transmitted to the air of a room, viz., by conduction, convection and radiation, all play their part, each being given a greater or less importance according as grates, stoves, furnaces, hot water or steam pipes be the method of heating adopted.

The following results, obtained by Profs. Carnelly and Haldane, of Dundee, Scotland, have much interest in this connection; but they are necessarily to be accepted not so much as indicating the value of any particular system as the mode of application of any of the systems accidentally adopted in those particular schools at that time.

Of 323 schools reported upon 150 were personally visited by Carnelly. The great differences were found in the amount of fuel used per pupil. One large school, with hot air furnace, used but 34 lbs. of coal per head in a season, while another used 417 lbs. One with an open fire used but 23 lbs., while another used 239 lbs. In a school for 1,000 scholars the cost in England averaged for installing the system £200 for grates and £500 for low pressure steam. The installation of a mechanical fan ventilating plant with heating cost in a building properly designed for it £850, and put in an old building not specially designed cost £1,000. The results of experiments showed that mechanical ventilation as by fans was much the most effective in maintaining the requisite purity and temperature of the air; was more independent of winds and changing weather; reduced draughts to a minimum, but has a greater first cost and somewhat greater cost for maintenance; but in a town with several schools one janitor could supervise the apparatus in all.

A more recent and perhaps more representative series of methods of heating and ventilation are those found in the reports prepared under the supervision of the Chief of the District Police of Massachusetts, 1896, who has special charge of the work of boiler inspection, fire-escapes and the heating and ventilating of public buildings, factories and workshops of the State. The several reports of this Bureau are of extreme interest, illustrating year by year an advance in the scientific supervision of public buildings. The report for 1896, referring to the ventilation of schools, says, "The practicability of ventilating schools admits of no doubt. It is a matter of exact knowledge as any problem in engineering or mathematics. It can be done by the aid of power, and may be accomplished by heated shafts or by fans; all dependence on natural ventilation should be abandoned. The system of mechanical ventilation can be relied upon with certainty. By mechanical means a steady inflow of pure air under all conditions and atmospheric changes can be secured. The extra expense for the power to move air should be recognized and met without question."

"When so many are enquiring how best to secure good ventilation in schools and other public buildings, the correct methods gained by years of experience should be made known. In this matter of ventilation there are comparatively few who have made it a speciality and have felt it necessary to perfect their knowledge. The time has been reached when the importance of ventilation is generally appreciated, and there seems to be a willingness to do something for the health and comfort of the pupils in our public schools, and it would be a misfortune not to achieve some real progress."

"Good ventilation consists in the proper arrangement and distribution of the ducts of the incoming and the outgoing of the air, and their relation and correspondence with each other, so that the perfect removal of the foul air and the thorough diffusion of the fresh air will be secured. How to supply the occupants of schoolrooms or crowded apartments with the proper quantity and quality of air has not always received the attention its merits demand. Something, however, during the past few years has been done towards an intelligent solution of the problem. To know how much air is needed for a given number of pupils in a schoolroom and to supply it by exact mechanical measurement is now no secret."

"In former reports I have explained some of the methods advocated and in operation in school buildings in the State. One of the methods or systems concerns itself only with supplying air, leaving it to make its way through ducts provided for that purpose. This is done by means of fans or blowers forcing the air into the room. It is the plenum method. Another system or method advocated is directed to the extraction of the foul air by natural laws, requiring no mechanical means, depending upon the difference between the external and internal temperature, in other words, the tendency of warm air to rise."

"In our experience of the past eight years we have found that the interior temperature of foul-air ducts is practically the same as that of the room. The changes in the temperature are so frequent and the velocity of the wind so various, that, unless additinnal heat is supplied to the duct, the power of the duct or shaft to draw air from the room will fail in many instances to cause upward motion enough to be measured by the anemometer."

"The ways of adapting the means to the end in furnishing to and removing air from crowded rooms are not questions of experiment. The size of ducts, shafts, etc., their location in the rooms and their distribution are not at the present time severe problems. The questions, "Shall the air be taken in at the floor or at the ceilings?" or "Will an upward or downward movement in the air work to the best advantage?" have been settled upon principles which are available for the practical solution of the problem of ventilation."

"For the effective working of any system of ventilation, it is imperatively required that proper provisions should be made to promote air currents in the right direction, and first in the fresh-air inlet,—the supply of fresh, pure air from pure external sources. The size of this fresh-air inlet is of great importance. In many instances when provided in our public buildings it has been found to be too small. The warming of the incoming fresh air should be considered at this point. Varieties of heating appliances are in use for the purpose of warming the air, two of which I will mention,—the hot air-air furnace and the high-pressure or low-pressure steam apparatus."

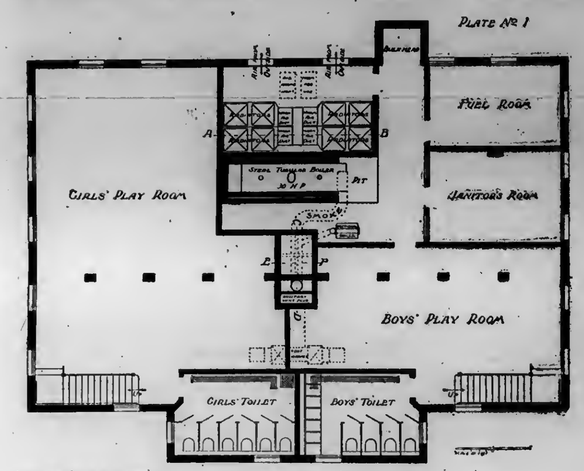
The difficulties to be overcome by the adoption of any system depend upon the operation of the same principles. Heating by convection is due primarily to the movement of air upwards, heated and by expansion made lighter, and falling again as it is cooled by walls and windows. By these currents of warmed air coming in contact with our bodies, we are prevented from cooling with undue rapidity in the same manner as by conduction the air of the room is cooled by the cold outer walls and windows. It will thus be apparent that with outer currents of air, as winds blowing against a building, the porosity or openness of the walls and the conductivity of the building materials and the doubling of the windows, must all play important parts in the ventilation and heating of dwellings. To minimize the variations of temperature caused by these several influences in different rooms and at different parts of the same room, to maintain the air at a temperature of 60° to 70° F., to secure a humidity of the air approaching 70 per cent. of saturation and to keep the carbonic air in the room at a point below six parts in 10,000, or to secure from thirty to fifty cubic feet of fresh air per minute for each inmate according to age, and to do this economically, is the problem of ventilation.

This must be secured too in such a manner that the velocity at the inlets shall not exceed six feet per second, to be reduced to half a foot per second, when coming in contact with inmates to prevent the sensation of draughts, although experiment has taught us that a velocity of two to three feet per second of air at an ordinary temperature may be endured without a sense of notable discomfort. How much this last point means will be understood, when it is remembered that a room containing 500 cubic feet of air having an inlet of twelve inches square, if supplying 3,000 cubic feet per hour, would have a velocity of .83 feet per second while supplying only enough air for one adult person. It is thus apparent that in order to maintain the requisite purity of house-air without an excessive air movement, a minimum air space fixed by some at 750 cubic feet per capita is necessary, thereby permitting some four changes of air per hour.

Apart from the question of heating and propelling the air into a room, it is equally clear that the size of fresh-air inlets and outlets is of primary importance in the question of the movement of the air. An illustration will make this evident. Assuming that properly warmed air can safely move at a rate of two feet per second without discomfort, and that the fresh-air inlet occupied a quarter of one wall of a square room thirty feet wide, it will have renewed the air in the room within two minutes, or thirty times in an hour. As this air is distributed over a space in the room in columns, four times the volume of that opposite the inlet, the general velocity in the room would be but one-quarter that at the opening, or six inches per second. If further the rate of renewal be lessened, it is apparent that the size of the inlet can still be notably reduced if the distribution of the air at the point of entry

to the room is assisted by the shape of the inlet. Many of these elements which enter into the problem have been estimated, and even given their place in tables ; but it is well that the various elements of the problem be recognized. This may be done by a single example.

A school house of four rooms, each to have a cubic-air space



of 240 cubic feet (or 4 × 4 × 15) per pupil for a school of 200 pupils is to be heated and ventilated.

The construction of the building having been made upon the principles of building already indicated, we have to supply means of ventilation for supplying 2,000 cubic feet of fresh air per pupil per hour, or 100,000 cubic feet per hour must be poured into each room with cubic capacity of 12,000 feet. This means 8⅓ changes of air per hour, or a renewal of air every 7 1-5 minutes. An inlet of 2 ft. × 2 ft. would deliver the requisite volume of air if moving at the rate of 6.94 feet per second. With the ordinary smooth ducts, as when lined with tin, to prevent friction as far as possible, it is estimated that from 20 to 25 per cent. is lost by friction, so that in the present instance the duct delivering air in the amount stated at the rate indicated should be about 2 ft. × 2.5 ft. in area. It is apparent that the forward movement of this volume of air will depend not only upon a steady motive power, a vis a tergo, by which, as with a fan, a regular pressure is maintained in the duct, but also upon there being a free exit duct to conduct the air from the room, which removal of air can indeed be accelerated by an exhaust fan at the outlet of the duct or by a coil of steam pipes in the exit shaft by which the air is heated and thereby made to ascend. Much experience in ventilating shafts by the officers of the Massachusetts Bureau leads to the conclusion that "as a rule, a reduction of one-fifth the area of the foul air outlets for the size of the fresh air inlets has proved sufficient for inflowing fresh air. I have seen no reason to change this statement, and it will be found that ventilating engineers and architects who have been most successful in obtaining good ventilation have varied but little, if any, from the above rules." It is apparent that with the size of the inlets being determined as being, say 80, the outlet would be represented by 100. Along with the various elements as regards the size of inlets and outlets, it is important to have determined by experiment the most successful points at which inlets and outlets should be placed in any room, in order to promote the even distribution of the air introduced. Both English and American authorities are now agreed that in rooms of the ordinary size, as those in schools, inlets should be arranged on the inner walls, at a point from 6 to 8 feet above the floor, while the outlet should be at the floor in the same wall, and in close proximity to the outlet. This arrangement is based upon the fact that the incoming air is usually warmer than that of the room and therefore tends to ascend, and with the forward movement the impulse along with the higher temperature will distribute the fresh air to the farther side of the room ; it being further aided by the lessened pressure caused by the downward movement of the chilled air along the outer wall, and the outward movement of this air along the floor to the outlet.

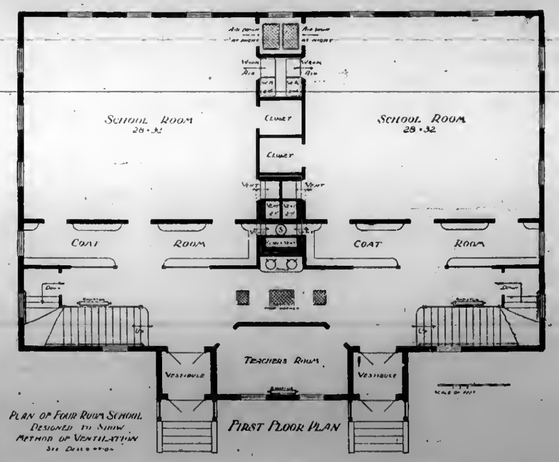
Summing up these points Mr. R. R. Wade, of Boston, Chief of the Police Inspection Commissioners, says :

"Whatever differences of opinion may exist as to the merits of the various appliances that have been applied for the ventilation of schools or other public buildings, it must be admitted that the system that can furnish and remove under perfect control a sufficient amount of air, with a velocity that can be regulated and so distributed as to supply fresh air and remove foul air from each room with regularity and perfect independence of weather, summer and winter alike, should be the system to be adopted, and in all appliances that is the simplest which most positively and directly effects the purpose in view."

The problem of heating the air equally has in every system proved of much difficulty in practice when a definite amount of fresh air is to be delivered. In estimating the work to be done, it is apparent that an average external temperature must be taken as the basis of ordinary work, and that for extremes a system of extra coils must be supplied either in the rooms or in the fresh air chambers in the basement. A four-horse power gas engine has been proved sufficient to give to a 4-foot diameter fan enough revolutions to supply 1,000 persons (pupils) with 2,000 cubic feet per head per hour ; hence with any system of steam heating, boilers of sufficient power can be economically used, even where electricity is obtainable for supplying power to fan.

In the problem here we may assume that the outer air is to be heated to a temperature as low as 15° F. in the basement cold-air chamber, to be delivered in the room at 70° F., and that for colder weather steam coils be placed in the rooms for subsidiary heating.

PLATE Nº 2

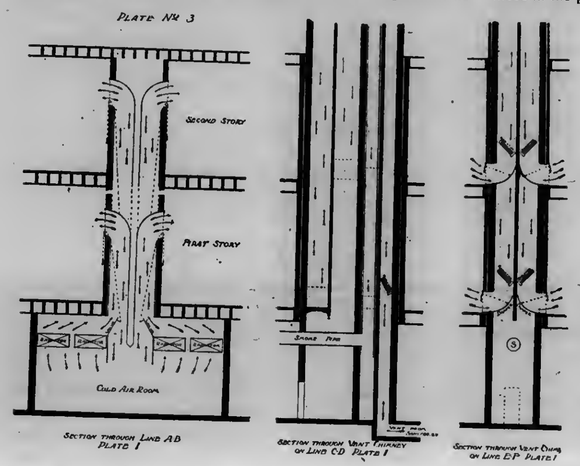


In practice it may be said that the same number of heat units is required to raise water through any degree of temperature from 32° to 212° F., and proportionately air through any degree from 15° to 70° F., the ratio between air and water being at 212° F., as 1 to 1,000. Now the weight of a cubic foot of dry air at 32° F. and 30 inches of barometic pressure is 566.9 grains, or 100 cubic feet equal 81 lbs. Assuming that a cubic foot of water at 212° F. weighs 60 lbs., it will hold 10,800 units of heat. Hence it would raise 3,272 cubic feet of air through 55° F. It has been estimated that the combustion of 1 lb. of coal will produce 14,000 heat units, and if the combustion in an ordinary furnace amounts in loss to 3,200 units, or more than one-fifth, we find that 1 lb. of coal will raise 1 cubic foot of water from 32° to 212° F., or will heat 3,272 cubic feet of air. Or, roughly, 4 lbs. of coal will be sufficient to heat the 12,000 feet of air required to change the air of a room, 32 ft. × 25 ft. × 15 ft., in 7½ minutes. It is apparent that the amount required will be the same, whether the method of heating be by hot water, steam or hot-air furnace, provided the combustion be equally good in all and the loss of heat the same, if the mechanism provided supplies the heat to the fresh air all at the same rate.

Taking warm weather with cold weather throughout the winter season in Ontario, this calculation would mean that, for a school-building of four rooms of the above size and holding 200 pupils, from 25 to 30 tons of coal would supply an adequate amount of heat.

The illustration of principles thus given in some detail enables us in some degree to estimate the various factors entering into the problem of ventilation. Many simple methods are adopted for lessening the evils of over-crowding and air foulness in small buildings, but the scientific problem having had its practical solution in a large measure determined, it now requires some

PLATE Nº 3


SECOND STORY
FIRST STORY
COLD AIR ROOM
SECTION THROUGH LINE AB PLATE 1
SECTION THROUGH VENT CHIMNEY ON LINE CD PLATE 1
SECTION THROUGH VENT DUCT ON LINE EF PLATE 1

specific measures for its systematic application to schools and public buildings. As an illustration of modern systems in practical operation the following may be given. It is from the Massachusetts report for 1896.

The plans are simply to show how the heating and ventilation of a four-roomed school building may be simply arranged :

The basement provides for the boiler-room with a 30 h. p. boiler, a cold-air room, the coal-room, the boys' and girls' play-rooms, the w. c. and lavatories.

The ground floor has its hall-way, and 1st and 2nd schoolrooms, its inlets and outlets for fresh air, and its cloakrooms.

The first floor has the principal's room, and the 3rd and 4th rooms, similarly heated and ventilated.

The third plan shows us in section the ducts and arrangements of cold-air rooms, and valves for regulating the temperature in the rooms, operated either by a chain or thermostat.

The areas of the ducts are given, while the heating provides for steam coils in three series so that 100, 120, 140, square feet of radiating surface for each room, may successively be turned on as the external cold increases. In some the heating and ventilating arrangements provide for part of the steam coils to be in the school-room, and these supply the extra heat in severe weather by direct radiation. The ventilation may similarly, and with advantage, be supplied by a fan. One of 3 feet in diameter not exceeding 600 revolutions per minute, will supply more than the calculated requirements of such a building.

It is apparent that with whatever system we may adopt there are many details in its practical operation which demand intelligent supervision if successful results are to be obtained. The questions of friction and the size of fresh-air ventilating shafts, the velocity of cross-currents of air at the entrance of the shaft for fresh air from the exterior, the variations in barometric pressure and in external air temperature, all demand an intelligent comprehension of such causes and their effects, and of means in the mechanism of ventilation of making compensation for such variations. From the standpoint of legislative enactments to provide for the application of scientific means to secure a standard of ventilation in any public building and for supplying such system of expert officers for inspecting and regulating this work in public buildings in this Province, it would appear evident that at the present time there is no means similar to that for many years in operation in Massachusetts adequate for the work to be done. Local Boards of Health have, under the general provisions for inspection of the Public Health Act, probably enough powers to correct any serious unsanitary condition, but the exact scientific knowledge requiring to be applied to any particular case demands some special scheme to be formulated, so that new buildings in all urban municipalities and all school buildings in rural districts should have their plans approved before construction, and certainly proper provisions for ventilation, while definite powers to compel the adoption of adequate measures in old buildings should be put into systematic operation.

It will be, gentlemen, for you who are trained in the exact sciences which relate to this important matter, to so influence those in the position of municipal officers and trustees of schools to institute such improvements as will attain such desirable results as I have endeavoured to set forth.

TESTS OF DEAL AND PINE DOORS.

THE British Fire Prevention Committee report the results of a recent test of a fierce fire of one hour, gradually increasing to a temperature of 2,000 degrees Fahr. upon a 2⅝ inch door of archangel deal, constructed in three thicknesses, and a 2⅝ inch door of Quebec pine, similarly constructed.

The doors were 7 feet high by 3 feet 7 inches wide ; they were constructed of three thicknesses of ⅞ inch boards, the middle thickness being horizontal and the outer ones being vertical. All were tongued and grooved on the solid and nailed with 3 inch clasp nails clinched on the outside. The total thickness of the doors was 2⅝ inches.

Each door had wrought iron strap hinges, one near the top and one near the bottom, 2 feet 6 inches long, 2¼ inches wide and ⅜ inch iron bolts. The hinges turned on wrought iron pins, the ends of which were built into the walls. On each door were fixed two wrought iron latches, one near the top and one near the bottom, with wrought iron catches built into the walls.

The doors were hung in brick rebates and before they were put into position the rebates were screeded with plaster mixed with lime mortar.

The doors fitted closely against the screeds, and the joint between the door and the brickwork was pointed on the outside immediately before the test.

The door openings were approximately 3 feet 3 inches by 6 feet 9 inches. The fire was applied from one side and the doors were to open inward onto the fire side. The fuel used was gas.

The results are summarized thus :

DEAL DOOR.—In 30 minutes flame appeared over the top intermittingly ; in 42 minutes flame also appeared down west side about 12 inches ; in 55 minutes flame came continuously through the upper portion of door ; in 65 minutes the upper portion of door was considerably burnt and flame was seen through several small holes burnt in the lower portion of the door.

PINE DOOR.—In 52 minutes no flame had come through the door or from the joints around same, although much smoke had come from the joints, and the wood around all the bolts and nails was much scorched ; in 60 minutes flame came over the top of door and also through its upper part in several places ; in 70 minutes, after water had been applied, the two inner thicknesses of the door were found practically burnt away and the outer thickness (which was for the most part in position) much damaged.

Fawn color or antique oak woodwork may have dark dull drab walls with a frieze of Gobelin blue or red, dull drab, Gobelin blue or red cornice, light drab ceiling, with upholstering of drab, Gobelin blue and Gobelin red, and draperies of blue and Nile green.

THE BUILDER

[THIS DEPARTMENT IS DESIGNED TO FURNISH INFORMATION SUITED TO THE REQUIREMENTS OF THE BUILDING TRADES. READERS ARE INVITED TO ASSIST IN MAKING IT AS HELPFUL AS POSSIBLE BY CONTRIBUTING OF THEIR EXPERIENCE, AND BY ASKING FOR PARTICULAR INFORMATION WHICH THEY MAY AT ANY TIME REQUIRE.]

Preparing Estimates.

THE first thing to be considered in the preparation of an estimate is the excavating and removal of surplus earth, if any. This should be made up into cubic yards, and the measurements should extend at least three inches beyond the outer edge of the footing; with extra beyond for batten of sides of excavation, depending on depth and nature of soil. If the surplus earth is to be carted away to some distance, figure accordingly, if wheeled out and left on lot charge for every twenty yards traversed. Excavating trenches for foundation walls should be accounted by the yard, and should be charged at a higher rate than for open excavations. The same should also be charged for excavating for pier footings and similar work. When underpinning is required and excavating is necessary extra care and time must be provided for in the estimate. Filling in and ramming to foundation must be charged for at a special rate, so also must be the cleaning up and grading the grounds after the foundation is in. All excavations for drains, pipes, etc., must be figured on, but when the contractor intends to sub-let the plumbing he may obtain the figures for the whole of the work in that department from the plumber.

The Mason Work.

Find the number of cubic feet of stone wall there will be in the foundation, footings, offsets and all projections included. One hundred and twenty-eight feet of loose stone make a cord according to custom, and one hundred cubic feet in the wall make a cord of finished mason work. In estimating for this work some account must be taken of the style of work and the character of materials, as it will take up more time and labor to build a wall with the harder stones than it will with freestones or sandstones. Usually, ordinary foundation walls are built up of rough quarried stones in random rubble as shown at Fig. 1. It will be noticed that only at the

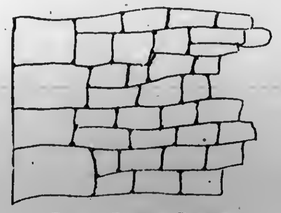


FIG. 1.—RANDOM RUBBLE.

corners is there any attempt at regularity, the other corners being formed of stones of any thickness. This style of masonry is about the most economical to construct, but when well done is quite suited to the purpose of the ordinary dwellings or buildings not more than three stories high. A good mason will lay from two to three cords of this kind of work in a day, with proper help. In country places where quarried stone is not obtainable or obtained only at a big cost, walls are often built with field stone, but it is not safe to load up walls of this kind with too much superincumbent weight. A wall of this sort may be built very cheaply and some country masons are quite expert in laying field stones, and will put in three or four cords a day if proper help is allowed them. Another style of masonry is shown at Fig. 2, which is laid up, with broken field stones. This

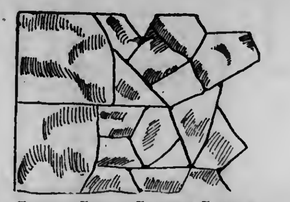


FIG. 2.—RUSTIC RANDOM RUBBLE.

is "rustic random rubble." The stones are fragments of "hard-heads," or large field boulders. With the exception of the quoins the joints are irregular, and as the stones are of various tints, the face of the wall, when the work is well done, shows up very nicely. This style of masonry is more expensive than either of the preceding examples, and this fact must be considered when estimating. There are several other styles of masonry employed in laying foundation walls, such as "coursed rubble," "irregular snecked rubble," "random rubble built up to courses," "broken ashlar," and others, but these are generally used on more expensive buildings than such as these paragraphs are supposed to deal with, so we pass them over for the present.

Brickwork.

IN estimating for brickwork several things are to be taken into consideration before the price per M is determined. It is usual among bricklayers in the country towns to set a price on brickwork in the wall at so much a thousand; without taking into consideration the style of openings or the quality of the work required; and this price is generally the lowest given for work of the cheapest sort, a fact that often places the contractor in a false position, for it frequently happens that the better kind of brickwork costs double that of the common sort—the kind the contractor figured on—and this should be provided for when the estimate is first prepared. Openings having semi-circular or curved heads cost twice as much to construct as those having square heads and lintels over them, and gauged arches

with rubbed joints cost nearly twice as much as an arch made up of chipped bricks. Again, an elliptical or a four centred gothic arch costs much more to build and prepare the bricks than either of the foregoing. Circular work of any kind, bay windows or oriels, octagonal work, panels, belt courses, cornicing, gables, chimneys and offsets, take much more time to construct than ordinary running work, and should be provided for in the estimate. Hollow walls should be measured as per the actual thickness of the brickwork, with ample allowance for bonding and for extra labor. Half of all openings should be counted as solid wall under 110 feet face measure, to cover waste and extra labor. Bricks laid up in cement should be charged for extra labor and extra cost of cement. All wrought-iron bonding when used must be charged extra, as well as extra time employed in setting same. Building in fireplaces, setting in grates, placing in jamb tiles, and laying hearths should all be charged extra apart from the cost of materials. Piers for steps or for verandahs having two or more faces are extras and should be priced accordingly. When colored mortar is used there should be added to price of labor from 5 to 8 per cent., besides the extra cost of material; black mortar being the most costly to handle. Cleaning down the walls, while generally considered by contractors as run in with the price per thousand, is really an extra, and should be charged as such when closing the estimate, so also, should be the cleaning up of the grounds and removal of waste and rubbish. In topping off walls or finishing copings where cement is employed, the extra cost should be included in the estimate. In figuring up for the number of bricks required to complete any given quantity of work, the following rules may be of service. As before stated all openings having 100 or more square feet are not counted, but all having less than 100 feet are measured as one-half solid wall, therefore an opening having 90 square feet surface should be measured to contain 45 square feet of solid wall. This is allowed to cover waste and extra cuttings. Openings should all be measured at their greatest height and width. In measuring for a nine inch wall it is usual to allow 12 bricks for every square foot on the face of the wall, and for a 13 inch wall 22 bricks for each square foot, and 29 bricks for an 18 inch wall. In an experience of many years the writer has found these figures to be a trifle under the mark, and found that about 5 per cent. added to the result was nearer the correct thing. Chimneys having 9 x 9 or 9 x 13 flues are generally measured solid throughout, but chimneys having larger flues some reduction may be allowed. No reduction should be allowed for stone trimmings, such as caps, quoins, sills or stone belt courses, if the bricklayer sets the stones, but if the stones are set by a mason or other contractor. One barrel of lime contains three bushels, which, with one yard of sand, will make one yard of 1 to 3 mortar, which will lay about 80 feet cubic of rough brickwork or common rubble. One yard of colored mortar should lay about 90 cubic feet of fine brickwork. There should always be a damp course in brickwork, and the estimator should provide for this in his estimate. It may be of slate, asphalt or cement.

Setting Stone Work.

AFTER the blocks are properly prepared and the surface on which they are to bed being truly level, the setting is an operation demanding great care in order to secure good joints and solid trustworthy work. In stonework, it must always be borne in mind, only fine mortar is admissible, and this should be clean and the materials sharp, and it is important that no dirt, clay, or other uncementitious substance be interposed, as this destroys the binding of the cement, and, if of hard texture, is liable to fracture or chip off the delicate arrises of the blocks. Large stones should be first tried on their beds before setting, and then raised and withdrawn, the bed finally cleaned, well wetted, and the mortar laid even; the stone should then be brought near its place and gently lowered upon wedges, by withdrawing which it is brought exactly to its bed, when it may be pounded down home by a suitable wooden mall or block of timber. Stones are raised and lowered by aid of a lewis, which is a contrivance for securing a firm hold of them, without defacing the faces or injuring the joints, the lewis hole being made on the top of the block, which becomes in turn the bed for the stone above. Cramps, joggles, dowels and plugs are names commonly applied to four different forms of connections respectively, thus: A cramp, which may be of lead or copper, is from six to ten inches in length, and from 5/8 to 1¼ inches in thickness, having each end turned up to act as the cramp, and from one to two inches wide, according to the size of the stones to be joined together. If the cramp is of copper it is torged to the form and run in with lead. Lead cramps are formed at once by running the molten lead into the channels prepared for it. Joggles are of a double wedge form and usually of slate. They are sometimes cubes, inserted so that their diagonals coincide with the joints. Slate joggles and dowels are laid in fine cement or oil putty. Dowels are of a common square section, and are more frequently applied vertically, that is, to the beds of the stones, being inserted in the top of one block of stone and the bottom of another. A plug is similar to a dowel, but is formed by the mortices being run with cement or lead. Mason work is known as "plain" when worked to a smooth face; "sunk," when "cut in"; "stopped," when not finished to the end of a stone moulded, straight, cornices, strings, etc., without a bend; "circular," moulded circular neckings, columns, etc.; "circular circular," as in niches, domes and spheres; "dressed" or "cleansed" on face, and "tooled" on face. About 1/8 the volume of ashler masonry should be mortar. Rubble masonry per cubic yard requires, of stone 1 1/5, and of mortar, ¼. Masons' specifications require very careful consideration, in so far as the description, quality, and mode of working stone goes, but the architect's drawings should furnish all necessary information as to the quantity and disposition of the stonework of a building. Half-inch scale drawings should be prepared of the masonry of windows, doors, and other features, and the jointing should be well shown on drawings. These details may be supplemented with one-eighth or quarter full-size sections of window jambs, sills and mullions, door jambs and mouldings, piers with their arch mouldings, bases and caps, cornices, columns, etc. The net amount of stonework can thus be actually computed by the estimator, and the contractor can obtain a fair idea of the amount of labor on the work. Such details are also most useful to the architect when the preparation of the full-size working drawings has to be undertaken, as he can discover exactly how much stone is required for any feature.

The employees of the McClary Manufacturing Company, London, Ont., held their annual picnic recently at Port Stanley.

ANNUAL CONVENTION OF MASTER PLUMBERS AND STEAM FITTERS.

The National Association of Master Plumbers and Steam Fitters of Canada assembled in annual convention in Montreal, on June 25th. The sessions of the convention were held in St. Joseph's Hall on St. Catharine street. Mr. J. W. Harris, president of the Association, presided, and welcomed the delegates from outside places. In the absence of the vice-president, Mr. Mansell, Mr. W. H. Meredith, of Toronto, was requested to fulfil the duties of the office. The following officers and delegates were present: President, J. W. Harris, Montreal; vice-president, (pro tem.) W. H. Meredith, Toronto; secretary, P. C. Ogilvie, Montreal; treasurer, W. H. Meredith, Toronto; vice-president of Ontario, H. A. Knox, Ottawa; vice-president of Quebec, John Watson, Montreal; vice-president of Manitoba, R. Ross, Toronto; vice-president of British Columbia, Joseph Wright, Toronto; vice-president of Nova Scotia and New Brunswick, Frank Powers, Lunenburg, N. S.; Toronto, W. J. McGuire; Ottawa, J. McKinley, F. G. Johnston and H. Normand; Montreal, James A. Giroux, G. C. Denman, J. A. Sadler,

MR. W. H. MEREDITH,
President National Association of Master Plumbers.

Joseph Gibeau, Thos. Moll, J. W. Hughes and Joseph Lamarche; Windsor, P. C. Ogilvie; Halifax, Frank S. Powers and John McFatridge.

The president in his annual report stated that most of the local associations were in a prosperous condition. He suggested that a conference be held with the jobbers and manufacturers for the purpose of inducing them to sell to members of the Association only, and in return the members would agree to purchase only Canadian goods. In order to distinguish Canadian goods it was suggested that manufacturers should place a trade mark on their material. It was announced that the association of boiler manufacturers had declined to deal with the Association, and immediate action with regard to this matter was recommended. During the year an association had been formed in Hamilton, in which was included all but one of the master plumbers of that city. Rules and regulations had been submitted by the journeymen's association for the approval of the master plumbers' association, and conference committees had been formed to consider questions affecting both associations. The enactment by the Dominion Parliament of a federal law regulating plumbing throughout the Dominion was advocated.

The president appointed as a committee on resolutions, Messrs. Jos. Wright, Jos. Giroux and Frank Power.

The report of the sanitary committee, presented by Mr. J. W. Hughes, showed that an increasing interest is being shown in sanitary matters and that the public are demanding a better class of goods and workmanship, which demand the manufacturers are meeting in a satisfactory manner. Regret was expressed that in some of the older cities no steps had yet been taken to adopt modern plumbing regulations, and it was suggested that the Dominion Parliament should pass a general law on the subject.

Reference was made in the discussion following the report to the opinion of the city solicitor of Ottawa that municipal councils have only the power to pass regulations to prevent unqualified persons from performing plumbing work, but have no authority to pass by-laws regulating the construction of buildings, or to compel drain layers to take out licenses. The president stated that the provincial government of Quebec had given municipalities power to pass by-laws regulating building construction and plumbing in general. He suggested that while the Dominion Parliament could not be asked to pass a by-law it could pass a law dealing with public health.

The report of the vice-president for Nova Scotia and New Brunswick stated that last year had been a prosperous one in the lower provinces, and that plumbers were beginning to feel the benefit of being connected with the Association. There had been some difficulty with the journeymen but an amicable settlement was looked for. A new regulation had been passed by the Halifax Board of Health compelling all master plumbers to pass a qualifying examination as journeymen plumbers. It was suggested that the Association should endeavor to have this regulation apply to the whole Dominion. It was urged that steps should be taken to devise means to avoid the difficulties and losses entailed by want of a proper system of estimating.

The report of the vice-president for Quebec recommended that an effort should be made to revive publication of the Association Bulletin, and that the constitution be so amended as to provide that the secretary of the National Association must be notified of changes made from time to time in the officers of the local associations.

Mr. H. A. Knox, vice-president for Ontario, in his report, expressed regret that the plumbers of that province were not as sympathetically united as they should be. It was suggested that other towns should follow the example of Ottawa, Brockville, and Smith'st Falls, by affiliating with the Association.

The report of the Executive committee stated tha certain difficulties had arisen between the Hamilton association and the wholesale dealers, the adjustment of which it was hoped would soon be accomplished. Publication of The Bulletin had been suspended owing to lack of support. The appointment of a paid secretary was recommended.

The report of the secretary, Mr. P. C. Ogilvie, stated that the following are the local associations that are affiliated with the National Association: Montreal, 52 members; Toronto, 21 members; Halifax, 22 members; St. John, N. B., Stratford, St. Thomas, Hamilton, Ottawa, 11 members; London, Windsor, 8 members; Quebec, Kingston, Winnipeg, St. Catharines.

The committee on resolutions recommended the adoption of the President's report and the appointment of a committee to wait on the boiler manufacturers and ascertain what grievances, if any, they entertain against the Association; the adoption of the reports of the secretary and vice-presidents of Ontario, Quebec, Nova Scotia, New Brunswick, and Prince Edward Island, also the reports of the Sanitary and Executive committees. The Association was advised to endeavor to secure Dominion legislation on the lines suggested in the report of the vice-president for Nova Scotia. The hope was expressed that it might be found possible to continue the publication of The Bulletin.

The reports of the sanitary and executive committees were adopted.

A committee was appointed to report on the advisability of reviving the publication of The Bulletin.

Messrs. John McKinley, Ottawa; W. J. McGuire, Toronto; R. Ross. Toronto; J. W. Harris, Montreal; and J.A. Sadler, Montreal, were appointed a committee to confer with the representatives of the manufacturers and of the wholesale supply firms.

The question of the desirability of organizing provincial associations was left over until the next meeting.

Messrs. John Watson, John McKinley, Jos. Wright, Frank Power, Jos. A. Giroux were appointed a nominating committee, and Messrs. H.A. Knox, J.A. Sadler, and F. F. Power an auditing committee.

Mr. Frank Power, of Lunenburg, N. S., extended a cordial invitation to the Association to hold its next meeting in Halifax. The question of place of next meeting was, after some discussion, put to a vote, and it was found that the majority of the members were in favor of the convention being held in Toronto, and it so was decided.

A deputation representing the manufacturers and wholesale supply houses was introduced, when Messrs. J. W. Harris, J. W. Hughes, and Ald. Jos. Lamarche were appointed a committee to confer with them regarding any grievances or matters in dispute.

SECOND DAY.

On business being resumed on Friday morning, Mr. Joseph Wright reported on behalf of the committee appointed the previous day, that the wholesale supply trade did not care to advertise in The Bulletin, and recommended that for the present year no attempt be made to revive its publication. The report was adopted.

The report of the treasurer, Mr. W. H. Meredith, showed receipts of $609.50 during the year, which, with $170.44 carried over from the previous year, made a total of $779.94. The expenditure was $458.52, leaving a balance of $321.42. Mr. Meredith estimated that the surplus would probably be reduced to $200 after the official report of the proceedings had been printed.

The report was referred to the auditing committee, which certified to its correctness, and on motion it was adopted.

Mr. Frank Powers of Lunenbnrg, N. S., was appointed organizer for the Maritime provinces, and a grant of $25 was made to him for expenses.

The convention then proceeded to the election of officers, with the following result:

Past President—J. W. Harris, Montreal.
President—W. H. Meredith, Toronto.
Vice-President—John McKinley, Ottawa.
Secretary—W. Mansell, Toronto.
Treasurer—Ald. Jos. Lamarche, Montreal.
Vice-President for Ontario—W. Pennington, Windsor, Ont.
Vice-President for Quebec—T. Thibeault, Montreal.
Vice-President for Manitoba—J. H. Wilson, Toronto.
Vice-President for Nova Scotia — Frank Power, Lunenberg, N. S.
Vice-President for British Columbia—Joseph Wright, Toronto.

Chairmen of Committees: Apprenticeship, T. G. Johnston, Ottawa; Legislative, J.W. Harris, Montreal; Sanitary, Frank S. Power, Halifax; Essay, E.C. Mount, Montreal.

Each chairman selected his own committee, and before the convention adjourned the following had reported:

Sanitary—F. S. Power (chairman), G. A. Perrier, Geo. Kinsman, James Farquhar, all of Halifax, and Frank Dexter, Truro, N. S.

Apprenticeship—F. G. Johnston (chairman), John Hyman, H. A. Knox, H. Normand, E. B. Butterworth, all of Ottawa.

Essay—E.C. Mount (chairman), John Watson, Joseph A. Giroux, Joseph Gibeau, and P. J. Carroll, all of Montreal.

On motion of Ald. Lamarche, seconded by Mr. F. S. Power, a hearty vote of thanks was tendered to the retiring officers.

In accordance with the suggestion of the vice-president for New Brunswick a committee was appointed consisting of Messrs. Frank S. Power and John McFatridge to compile an estimate and price book to be sold to the members.

Mr. Knox stated that the plumbers' association of Ottawa, had notified the architects of that city that they would only submit tenders direct to the proprietors, and it had been found to work well. Mr. Wright stated that an effort in the same direction was being made in Toronto.

SOCIAL FEATURES.

The social features of the convention included a banquet at the Windsor Hotel, which was attended not only by the plumbers, but also by a large number o the manufacturers and wholesale supply firms, among whom were noticed: Messrs. John M. Taylor, manager of the Dominion Radiator Co., Toronto; H. W. Anthes, of The Toronto Foundry Co.; Alex. Robertson, of The James Robertson Co., Limited; Geo. Moffat, of Robert Mitchell & Co.; H. R. Ives and E. Hebert, of H. R. Ives & Co.; H. McLaren and McAvity Stewart, of McAvity & Co.; Mr. Ramsay, of The Pedlar Roofing Co.; Mr. Moore, of The Paul Heating System Co., Boston; J. H. Garth and J. A. Meadowcroft, of Garth & Co. In addition to the usual patriotic toasts was one to the "National Association of Canada," proposed by Mr. Frank Powers and responded to by past president Harris; "The Corporation of Montreal," responded to by Ald. Lamarche; "Our Guests," proposed by the new president, Mr. Meredith, and responded to by Messrs. H. W. Anthes, H. R. Ives, Alex. Robertson, John M. Taylor, Mr. Stewart and Mr. Ramsay; "The Montreal Association," responded to by Mr. Giroux. The success of the banquet was largely due to the efforts of the committee, Messrs. Giroux, Meadowcroft and Sadler.

On Thursday afternoon the delegates were taken for a carriage drive to the top of the mountain where luncheon was served. On Friday afternoon they were given a street car ride through the city to Lachine and from thence made the trip down the Lachine rapids.

LEGAL.

In a recent case in England the plaintiff and defendant were owners of adjoining plots of ground forming part of a building estate, and these plots were each subject to a covenant that not more than one house was to be built on each plot. The defendant wished to build a block of flats upon each of his plots, but the plaintiff complained that this was a breach of the convenant, and sought for an injunction to restrain the defendant from erecting these buildings. The motion was refused by the Judge, who was of the opinion that each block of flats was one house only, and not a series of houses as contended, and the plaintiff appealed, but the Court dismissed it, the Master of the Rolls confirming the judge's opinion. In his opinion the word "house" in the covenant did not refer to the mode in which the building was to be subdivided and let, but the aggregate of the rooms making up the building. When the word was applied to a covenant of this description it did not refer to the interior portions of the building, but to the whole thing. One of the London papers says that the decision is important as affecting all future restrictive covenants, as if a block of flats is intended to be excluded it ought to be so described.

According to a recent decision of the Queen's Bench Division of the British Courts, contractors are responsible for the safety of scaffolding erected by sub-contractors employed by them, unless there is specific agreement to the contrary. This decision was given in the case of Pavis v. Wills. The plaintiff, who was employed by a sub-contractor in the erection of houses at Battersea, whilst working under a scaffold constructed by another sub-contractor, met with an accident which injured his thumb by a slate falling through the boards, and was unable to work for four months. The scaffolding was put up by the sub-contractor for brickwork; but as he had not pointed the walls the scaffolding was not removed, and it was utilized by other sub-contractors. The defendant appealed. The case was heard on appeal by the defendant builder from the decision of the County Court by Mr. Justice Ridley and Mr. Justice Darling. They held the builder responsible because he had contracted for the erection of the scaffolding by the sub-contractor for brick-laying; that he permitted it to be used, and had allowed it to remain on the premises. Although he had not provided it or constructed it, the judges inferred that he had adopted it, and permitted workmen to use it. The appeal was therefore dismissed.

The Court of Appeal at Montreal has reversed the judgment of Mr. Justice Doherty in the case of Sincennes and Courval, architects, and the Institution Catholique des Sourdes-Muets. The appeal arose from a judgment of the Superior Court maintaining the pretensions of the plaintiffs, as to their having a valid privilege on a certain property, belonging to the apellants, for the payment of their services in connection with buildings erected upon the property. The claim amounted to $180. The institution sold some lots to one Zotique Terriault, upon which he erected some buildings, Sincennes and Courval being the architects. In February, 1898, Terriault became insolvent, and left the buildings in an uncompleted state. In the terms of sale the property returned to the institution. On the 16th of May the architects registered their claim for $180 against the lots. A notice of this registration was on the same day sent both to Terriault and to the appellants by letter, mailed in the city of Montreal. The appellants received on the following day, or the 18th. The judgment maintained the privilege and ordered an expert to determine the relative value of the lot, and of the buildings, as provided by the Code of Civil Procedure. From this judgment the appeal was taken. The institution paid off certain claims against the property. The effect of the judgment of the Court of Appeal is that while it is declared that the architect shall have a privilege for such services as he may render under a contract between him and the builder, the article 2013c tells him it will exist only for eight days absolutely, and that if he wishes to preserve it beyond that time he shall give a notice to the proprietor. The court was therefore of opinion that the plaintiffs failed to preserve their privilege and by neglecting to give, within eight days from the making of their own contract with Terriault, notice of it to the proprietors, they can no longer exercise it against the property.

FERGUSON VS. GALT PUBLIC SCHOOL BOARD.—Judgment by the Court of Appeal at Toronto on appeal by defendants from order of a Divisional Court setting aside judgment of non-suit entered by Boyd, C., and directing a new trial. The action is for damages at common law, and under the Workmen's Compensation for Injuries Act, for injuries sustained by plaintiff while engaged upon the construction of a retaining wall on the school premises, in the town of Galt. It was contended below that the evidence showed that when the accident happened the plaintiff was acting under the orders of one Webster, a superior, and that the accident occurred on the premises of defendants. The Divisional Court held that at common law, it being undoubtedly the duty of the master to provide good and sufficient apparatus for the servant, there was evidence here to go to the jury that it was insufficient and defective; and that under the Act there was evidence to go to the jury that plaintiff was acting under Webster's orders, and that Webster was plaintiff's superior, whom he was bound to obey; and there was evidence that Webster was a person entrusted by defendants with the duty of seeing to the conditions of the ways, etc., within sub-sec. 1 of sec. 6 of the Act, and Garland vs. City of Toronto, 23, A.R., 238, was distinguished. That court also held that there was no evidence, even if material, as plaintiff did not know it, to show that the defendants' workmen were trespassers. It was contended inter alia that at common law the plaintiff and Webster were fellow servants, and the way where the accident took was constructed by them according to their duty, and there was therefore no liability arising out of negligent construction (Hedley v. Pinkney, 1894), A. C., 222; and that there was no evidence to show that Webster was plaintiff's superior, or one to whose orders he was bound to conform. They were merely two fellow-laborers. Held, that plaintiff and Webster were fellow-workmen, and that this case is distinguishable from Garland v. City of Toronto, 23, A. R., 238. Appeal allowed with costs, and judgment of Boyd, C., restored.

NEW YORK AND OTTAWA COMPANY V. COLLINS' BAY RAFTING AND FORWARDING CO.—This important action came up for trial at the non-jury sittings of the High Court of Justice at Cornwall recently. The plaintiffs sought to have it declared by the court that the sum of $20,000 deposited in the Bank of Montreal as security for the fulfilment of certain work be paid over to them. In the autumn of 1898 the Collins Bay Rafting and Forwarding Company undertook a contract for the removal of the wrecked spans of the railway bridge in the south channel of the St. Lawrence River. Under terms of this contract they were to be paid $25,000 for a completed job, and were to have until the end of the season of 1899 to complete same. The New York and Ottawa Company deposited as security for the completion of the work $25,000 in the names of R. A. Pringle and Wm. Leslie as trustees. Five thousand dollars of this money was paid over to the Collins Bay Rafting and Forwarding Company in the fall of 1898, and the balance still remains in the names of the trustees. The New York and Ottawa Company contend that the Collins Bay Rafting and Forwarding Company have failed to complete their contract according to the agreement, and that the plaintiffs are entitled to have this money paid over to them. The New York and Ottawa Company also claim damages for the non-completion of contract. The Collins Bay Company contend that the time was not the essence of the agreement, and that they still have further time to complete their contract. The case was tried before the Hon. Mr. Justice Street, whose judgment declares that defendants have duly prosecuted their work without breach and are entitled to $5,000 of the contract price for removing the southern span of the bridge and $5,000 more for putting it on the shore, and dismisses action with costs without prejudice to plaintiffs' right, if so advised, to bring any further action or actions for any other or later breaches of the contract. Judgment for defendants on their counterclaim for $5,000 (in addition to the $5,000 already paid them) and counterclaim dismissed without costs as to balance claimed without prejudice to their right to recover in any future action the balance of the contract price if they show themselves entitled on the ground of completion of contract or any other grounds save those in paragraphs 8, 9 and 12 of defence and counterclaim.

The interior of the Cathedral at St. John, N. B., is being redecorated.

The annual picnic of the employees of the Gurney Foundry Company, Limited, Toronto, was held a fortnight ago at Burlington Beach.

It has been arranged that the members of the London Builders' Exchange shall pay a visit to the Builders of Cleveland, Ohio, on the 24th and 25th inst. The London Builders will reach Cleveland at 6.30 in the morning and will be met on their arrival by members of the Cleveland Exchange. The day will be spent at Senic Park. In the evening a banquet will be held at the American House A most enjoyable time is anticipated.

MANUFACTURES AND MATERIALS

TERRA-COTTA.

A lecture on terra-cotta and its uses was recently given at the Midland Institute, Birmingham, by Mr. J. C. Nicol. The lecturer, after pointing out the antiquity of the use of terra-cotta, as illustrated in the buildings of the Babylonians and Assyrians, described the composition of the material. Most modern manufacturers, he said, had to mix and blend their clays, bringing parts from a distance, so as to get together a suitable combination of texture and color, whilst some introduced color pigments, which in baking came out quite different from what was expected of them, though by repeated trials and observations good tints, particularly bluish-grays and pinks, could be obtained.

Architecturally speaking, the term terra-cotta was given to the blocks above the size of the ordinary bricks, and capable of decoration by casting from a modelled enrichment. The forms used should never be made on stone outlines, nor should the material be made to look like stone in any particular. It had a distinctive character of its own as a plastic and modelled material, although there was no structure in stone that could be worked out in terra-cotta. Indeed, by the use of iron brackets and concrete cased with terra-cotta greater projections could be obtained, and columns and entablatures of any size could be wrought out. Yet the architect who had been accustomed to design heavy stone buildings, and wished to change his material, would fail dreadfully if he did not realise that he was working in an entirely different medium. Terra-cotta itself would not outrage any of the canons of art, but the misuse of it would. When subjected to heavy weights in walls, due to imperfect filling, terra-cotta was liable to crack. The pocketing taken out to equalise the shrinkage in burning must be filled in with concrete that would not shrink when set. Referring to the durability of the material, Mr. Nicol said it was sometimes desirable in exposed situations that copings, cornices, and gutters formed in terra-cotta should have damp courses of lead or slate in case the joints should perish, and in all cases the ends and joints should be made in cement. All blocks should be equally well burnt, as the ordinary constituents of town atmosphere would then not affect it. The free acids found in the air of manufacturing centres like Birmingham would permeate the pores of the soft bricks and disolve the more soluble constituents.

THE CANADA RADIATOR COMPANY, LIMITED.

The Canada Radiator Company, Limited, whose advertisement first appears in this number, make the following claims in behalf of the "Canada" radiator. "The company is manufacturing a patented radiator with a positive and perfect circulation and differing from the ordinary radiator in that the steam or water must travel the length of each loop before entering the next. In the ordinary radiators as at present constructed the hot water ascends the first loop to the top and flows along the top falling throughout all the loops as it cools and discharges into the return pipe; thus the water only travels twice the height and once the length of the radiator, while in the "Canada" the water travels as many times the height of the radiator as there are loops in it.

In the ordinary steam radiator there is no provision at the top of the loops for the escape of the air, which is expected to fall to the bottom of the loop against the pressure of the steam and travel along the bottom of the radiator and then rise to escape through the air vent. This defect in construction has caused the introduction of what is known as the "Paul system of vacuum" which is largely used in all our large buildings. In the "Canada" the air is driven before the steam and there is no chance for it to pocket and thus hamper the circulation and expensive means for extracting it are not necessary. Owing to the perfect circulation and provision for carrying off the air the same radiator is adaptd for use in either a steam or hot water plant. This company claims that because of the construction of their radiators its use will save both in the installing of the plant and in subsequent fuel bills."

The Toronto office of the company is at 124 Bay street, where they have a very nice display.

The Manitoba Union Mine Company has been incorporated with a capital of $500,000 to manufacture portland cement at Miami, Man.

The works of the west Kootenay Brick and Lime Company at Nelson, B. C., have recently been purchased by a company organized by Mr. Ernest Mansfield. The new company will develop a marble quarry opposite Kaslo.

Mr. E. Brevender, formerly of the Napanee Cement Works, is organizing a company to manufacture portland cement at Lakefield, Ont. The town has granted the company a bonus of $10,000. Works will be erected at once, and will it is said be operated by electricity.

The New SOLAR PRISMS are the BEST and CHEAPEST

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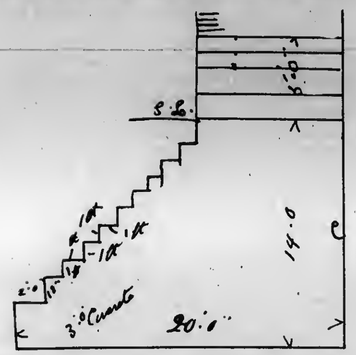
COLLAPSE OF A CHIMNEY AT HAMILTON.

To the Editor of the CANADIAN ARCHITECT AND BUILDER:

SIR,—You have in the CANADIAN ARCHITECT AND BUILDER an article on the chimney built at the Hoefner Refining Company's Works, Hamilton. Being the architect of the said structure, there are some points which I would like to explain. The copy of the plan is all right, only that the foundation was stepped up one foot higher, as per sketch. It was stepped up one foot each time off a two-foot offset on the concrete, instead of a two-foot step



each time off a three-foot offset on the concrete. In regard to the weight per cubic foot of brickwork, there are 18 bricks in one cubic foot, at 4¾ lbs. each, net 85½ lbs. of brick, and one cubic foot of mortar, 22½ lbs., or a total of 108 lbs. per cubic foot. There being 36,500 cubic feet at 108 lbs. = 1,640 tons, or 5¼ tons per cubic foot. A reliable contractor here states that the average brickwork will weigh 112 lbs., not 108 lbs., per cubic foot, which would still leave a fraction less than 6 tons to the cubic foot, and a safe load is 6½ tons. There was a very high wind at the time of the accident. The chimney fell in a N. W. direction, not N. E. We received a tender from a contractor to put additional 50 feet on the chimney before it was completed. This is the reason why the top of the chimney walls was so thick. The bricks were not all first class, but soft brick was smuggled in, also large ragged pyramidal stone with no particular bed, also other pieces, one especially of rotten blue slaty stone, which was thicker than two courses of brick and which crushed under the weight. The contractor also neglected to keep the tunnel and the chimney dry, there being fully 2 feet deep of water and ice in the tunnel, which saturated the brickwork throughout with damp and frost. The work was altogether in his charge to deliver complete. A good percentage of the money was held back. I gave the contractor no authority whatever to build in stone; he put it in at his own risk.

Yours, etc.,
E. B. PATTERSON.

PUBLICATIONS.

"Furniture Designing and Draughting." By Alvan Crocker Nye, Ph. B., Instructor in Furniture Designiog, Pratt Institute, Brooolyn. New York City: Wm. T. Comstock, Publisher, 23 Warren Street, New York, N. Y. One octavo Vol., Cloth. $2. For classes in design the book will serve as a text book, for with it a knowledge of the elemeotary forms and principles of construction necessary to good designs can be obtained. The experienced draughtsman will perhaps find the book a handy reference, as it gives in convenient form much data that is not always easily remembered. To the architect who occasionally must give some consideration to furniture, the tables of dimensions, if not the entire work, will be a great aid. In fact, this is a serviceable book for everyone who has to do with drawings for furniture.

Mr. George Warwick, one of the oldest contractors of Brockville, Ont., died in that city on July 11th, aged 80 years.

A despatch from Paris states that the International Jury of Fine Arts has awarded a third class gold medal to Mr. A. Luzor-Cote, a Canadian artist, for paintings exhibited in the Canadian department of the Paris exposition.

A despatch from London, Eng., states that the county council has decided to send a deputation of architects and engineers to the United States and Canada to investigate the methods of construction and system of management of public asylums.

Mr. Bernard McEvoy, who recently visited and inspected technical schools in a number of the leading cities of the United States, by direction of the Education Department of Ontario, has expressed the opinion that the Athletic Club building purchased recently by the city council of Toronto for technical school purposes is not adapted to properly fulfil that object.

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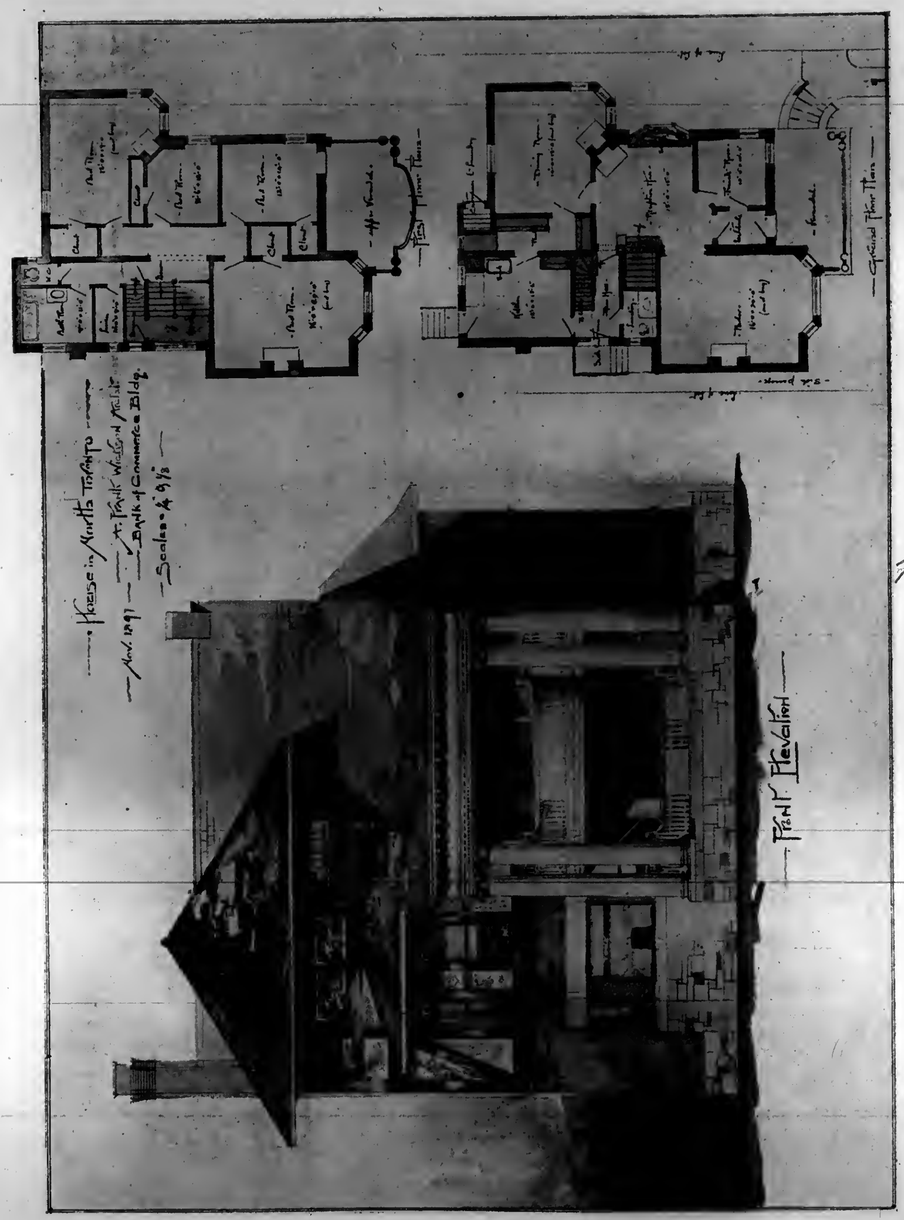
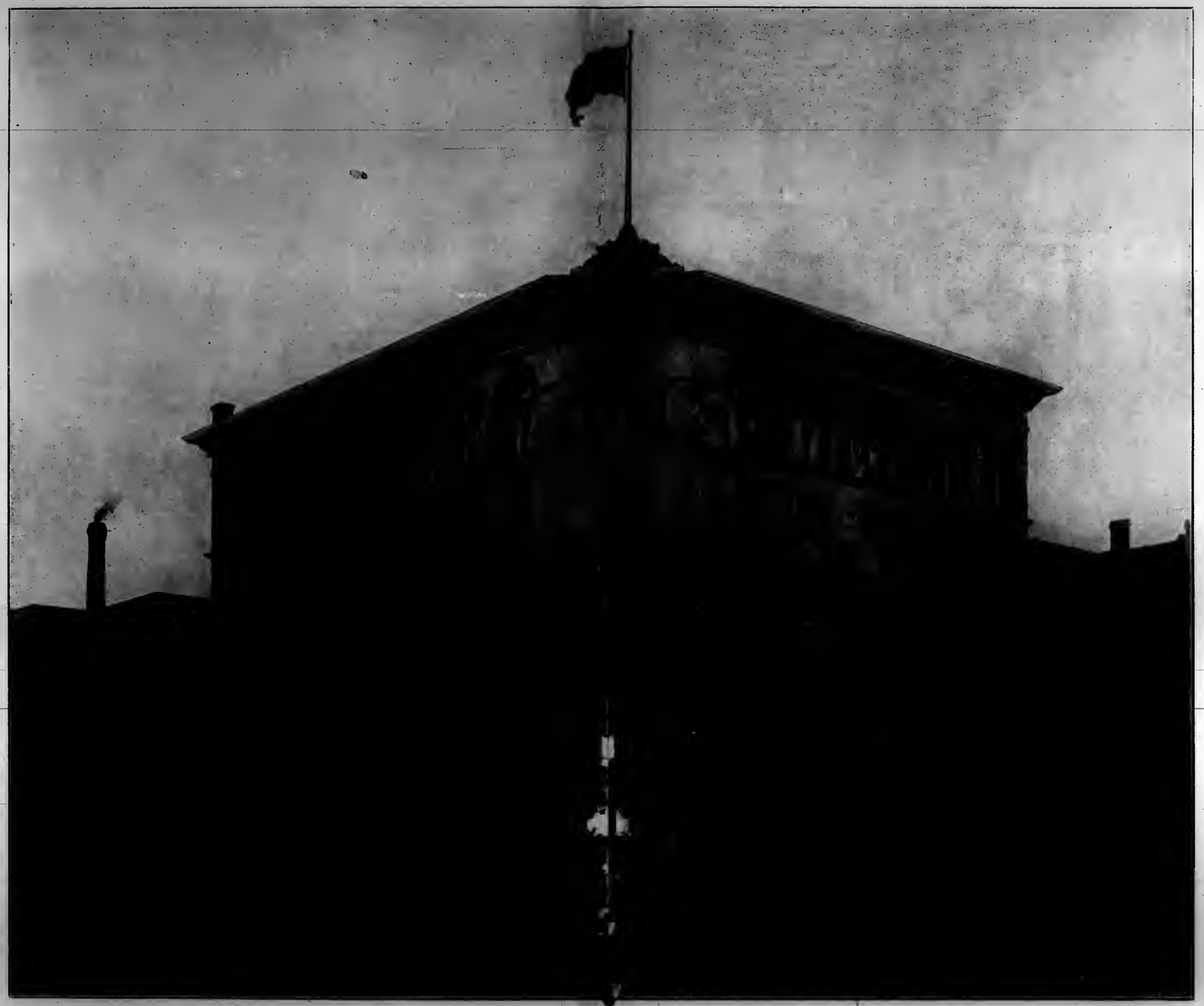


HOUSE IN NORTH TORONTO.

A. FRANK WICKSON, ARCHITECT.



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VOL. XIII.—No. 8. AUGUST, 1900 PRICE 20 CENTS. $2.00 PER YEAR.

—THE—

CANADIAN ARCHITECT AND BUILDER,

A Monthly Journal of Modern Constructive Methods,

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Telephone 2362.

Branch Office: NEW YORK LIFE INSURANCE BUILDING, MONTREAL.

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SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to foreign subscribers is $2.50. Subscriptions are payable in advance. The Journal will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrears of subscription paid.

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Prices for advertisements sent promptly on application. Orders for advertisements should reach the office of publication not later than the 15th, and changes of advertisements not later than the 5th day of the month.

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Architectural Excursions.

An effort was made to induce a number of architects of Toronto to pay a visit to Buffalo on Dominion Day. They were to have been met on arrival by members of the Buffalo chapter A. I. A. and shown the most interesting of the buildings of the city. Unfortunately, the project had to be abandoned because a sufficient number of the members of the profession in Toronto did not respond to the invitation. In view of the nearness of Toronto to a number of large American cities, it is to be regretted that the members of the Ontario Association of Architects do not organize and carry out every year an excursion such as the one proposed. It might be made a benefit to the members individually and to the Association as a body. There is required, however, a greater disposition than has been shown by members of the Association in the past to serve the interests of the profession as a whole at the cost of individual convenience.

The Heating and Ventilation of Schools.

A special committee of the Toronto Public School Board was recently appointed to collect data and report upon the best method of warming and ventilating school buildings, in order that the information might be available for use in the construction of a number of new schools now in course of erection. The committee communicated on the subject with the representatives of school boards in twenty-one cities in Canada and the United States, and invited opinions from several sanitary experts. In every instance replies were received. These show 13 systems in use in 525 buildings. The number of buildings in which each system is used is as follows: Smead, 115; hot air furnaces, 111; steam, direct, 80;

stoves, 80; steam, indirect, 80; steam, direct-indirect, 27; ruttan, 26; steam, indirect with fans, 9; steam, direct with mechanical ventilation, 6; hot water, 5; Peck & Williams, 4; steam, with hot blast fan, 2; hot air furnace with fan, 1. Ten cities reported in favor of steam heating direct and indirect; four in favor of the Smead system; one in favor of hot water, and one in favor of stoves. Nine cities reported in favor of steam systems, direct and indirect, for ventilation; five in favor of the Smead system; one in favor of stoves, and one in favor of hot air gravity. The average cost per room for all kinds of steam apparatus is given as $543.-74; the Smead system, $215; hot air, $198.61; hot water, $450; fan system, from $280 to $389. The committee recommend that in schools that are to be enlarged, where the Smead system is already installed, the furnaces be enlarged and evaporating pans introduced; that one of the new schools be heated with steam with fans and one with steam without fans. The recommendation is made that in the additions to schools where the Smead system is installed, flues be arranged for the introduction of steam at a future date. This seems to signify that the committee are prepared to discard the Smead system in favor of steam as soon as circumstances will permit the change to be effected.

Why Ontario Bricks are not used in Manitoba.

The fact was mentioned by our Winnipeg correspondent last month that owing to the excessive freight charges imposed by the Canadian Pacific Railway, pressed and ornamental bricks manufactured in Ontario cannot be sold in Manitoba in competition with American bricks. Enquiry of the manufacturing companies in Ontario confirms this statement. Most of the material used in Manitoba is imported from St. Louis. That city is nearer by about three hundred miles to Winnipeg than is Toronto, but this should not account for the great difference in the freight rate, which is 45 cents per cwt. from Toronto as against 27½ cents per cwt. from St. Louis. This disproportion is so great that, after paying a 20 per cent. ad valorem duty, the Americans have an advantage over the Ontario manufacturer of $7 per thousand. But for the prohibitive tariff imposed by the C. P. R. a superior article both as to quality and color could be supplied by our manufacturers to the architects and builders of the northwest, who would prefer to use Canadian material. The Ontario manufacturers made an effort to have the carrying charges reduced, but were told by the railway authorities that they could not afford to quote a lower rate. We had supposed that the C. P. R. was managed and equipped in such a manner as would enable it to compete with the American roads. Indeed, our recollection is that on one or two occasions the company fell foul of the American Traffic Association for having cut below the prevailing rates. It would therefore seem to be not so much a question of ability as of willingness to meet the rate granted by the Burlington and Northern Pacific to St. Louis shippers. Perhaps the company can get plenty of other classes of freight to carry at more profitable prices. Whatever the cause, it is to be regretted that our manufacturers should be deprived of entrance to the growing western market.

The Albert Manufacturing Company, of Hillsboro, N. B., have been awarded a silver medal for their exhibit of rock wall plaster, etc., at the Paris Exposition. Milne, Coutts & Company, granite manufacturers, of St. George, N. B., are also winners of a silver medal.

SHEET METAL AS SHEATHING.

When architectural writers dwell upon the beauty of details in old work, declaring them to be as endlessly nteresting to pore and ponder over as Nature's own work, and define such art as "the expression of the pleasure the workman took in his work," the Canadian architect can only feel that such writings do not describe the sort of work he can expect to have done. We do not deal with workmen, but with machines. The day for details which one can pore and ponder over is, if not gone for ever, yet not here now. The execution of our work is mechanical, and the beauty we must aim at is only such beauty as is independent of a "loving" hand; presenting qualities that the monotony of machine work cannot spoil.

The first and essential quality is of course composition of parts to which detail is only as the punctuation to a sentence. The second is feeling for material. A well composed building with its material showing itself to the best advantage is, even when the material is not of the most beautiful kind, a work in which we always take pleasure.

There is no material that has not been used in building with good effect; "gold, silver, costly stones, wood hay, stubble" are all there; the one condition of acceptance has been that every matcrial shall be used in a manner suitable to its character and shall exhibit its characteristic qualities. There is no reason to suppose that any material should not be used now, whereever it is wanted, if it is used under these conditions; in other words these seem to be the conditions of acceptability. It will perhaps be profitable to see how these conditions apply to ordinary sheet metal, a material which has great claims upon our attention as a durable and fire resisting finish.

The trouble that meets us at the outset is that the ordinary material, steel plate, must have some sort of finish to protect its surface and to render it presentable, so that we are at once off the safe ground of a natural surface left to the improvement of time and the atmosphere. However, we do not expect purity in metáls; and there are so many "finishes" devised for hardware that we need not reckon it beyond the limits of ordinary outlay to have steel plate work finished in any suitable tone, if there is a demand created by architects for such work.

We start then with the idea of a surface showing a metal finish. It is a substance which lends itself to repousse work, and it is not only a matter of course in these days, but seems reasonable, that this work should be done by a machine. We cover walls with machine printed paper which is, when it is well designed, a perfectly satisfactory form of decoration, and there is no reason why machine stamped metal should not be satisfactory also if it is well designed. What constitutes good design is more easily recognized than defined, indeed it is rather a matter for development than for definition. But it is safe to say that the best design is that which is most easily produced, that the key to it is to be found in the facilities of the material, and the power of the machine should not be used to force upon the material effects that would not be attempted by hand. The effect of such work is the play of light upon a modelled surface, and this a point to be remembered, not only in inventing patterns but in adapting old forms, like the egg and dart, from a carved o plastic example in which the effect is one of light and

shade. Anything approaching the sharpness of stone or plaster is foreign to the natural conditions of the material.

There is a peculiarity of all stock designs for metallic walls and ceilings which seems to be not only not necessary but injurious, producing a monotonous effect; this is the system of interlocking joints concealed by making them part of the pattern. It would probably be an improvement if the joints were recognizable as joints. Joints are no injury to tiled surfaces but rather an improvement, even when there is a pattern extending through several tiles. In fact this is a commonplace of decoration that construction lines are not a hindrance but a help. Why then not recognize this in the application of sheet metal by taking no pains to conceal the joints, but on the other hand, making something of them by fastening up the sheets of metal with nails having large or ornamental heads. We know that metal must be handled in small sheets and the mind is satisfied as well as the eye by a manner of applying that admits this fact. The standard size, 2x4 feet, either as it comes or cut into two pieces, should be about right for most purposes, and a single embossed form in the centre of each piece would be sufficient decoration. Enough variety of pattern could be obtained from manufacturers to relieve monotony. It will be noticed that, in the illustration given of a door from the Palazzo Vecchio at Florence, there are only two patterns but there is no appearance of monotony. These forms, though not done by machinery, are evidently made mechanically, and are so much the more an example that resembles work done under our own conditions.

If the embossed design extends beyond the area of a single plate it ought to be pleasanter to let the pattern extend itself without regard to the jointing, and the jointing attend to business without regard to the pattern. But it is not necessary to always have an embossed design. Plain or severe work will be all the better for having merely the metal surface well knobbed by the fastening nails. Why should there not be a coloured stencil applied upon the metal ground? Or one metal cut upon another? Or a metal surface combined with plastic details?

There is more likely to be development in the direction of variety if there is recognition and enjoyment of the characteristics of the material, when it looks like itself, than if it is chiefly valued for the facility with which it can be machine worked or built up to look like something else. There is no real variety in the various forms in which (to turn for a moment to external applications) sheet metal is made to appear. The representations of brick surface, rock faced stone surface, tiles, (to speak only of surfaces) have an unfailing bond of union in the inextinguishable and ever distinguishable appearance of being sheet metal and nothing else. There is no disguising it, and to try and do so only produces ugliness where there might be all the beauty of suitability and something more perhaps, if the designer is determined to regard his material as something to be made the best of on its own conditions.

The architectural possibilities of sheet steel as an exterior sheathing are not very promising, yet the plain tin roof of a plain stone house in Quebec has a genuinely architectural quality. We also recognize both ancient lead roofs and modern copper roofs as right and proper, however plain and straightforward; and copper is used thankfully by architects as a sheathing for oriel windows and other small vertical surfaces. There is evidently nothing wrong with metal, as metal, for covering external surfaces within limits. The real trouble with sheet steel for exterior as for interior work, is that its "patina" is neither ornamental nor preservative. In the latter condition is, in this case especially, the refuge; for, inasmuch as the sheathing cannot be put upon the market without some kind of protective coating, there is a possibility of giving, by means of the coating, an architectonic colour and tone that are lacking to the natural surface. If the manufacturers of sheet steel sheathing would divert ingenuity and expense from the endeavour to imitate constructive materials to experiment in search of a good plain or metallic lacquer they would, it seems likely, be doing the best thing to push their material to the full extent of its proper limit in architecture.

W. A. LANGTON.

BY THE WAY.

Conspicously posted on the front of a new residence in course of construction in one of the principal thoroughfares of Toronto, is a board on which is painted in bold letters the name of the architect. The public are privileged to regard the placard as a straight 'out advertisement on the part of the architect, or an intimation that he thinks his work has sufficient merit to warrant him in thus publicly claiming credit for its authorship. In either event I think straightforward procedure of this character is preferable to the round about methods adopted by some architects to secure public advertisement.

× × ×

Few people have any idea when they sign themselves "yours sincerely," that this phrase has any connection whatever with the building trade, says Brick. In the days when Rome was mistress of the world, marble and alabaster were entensively used for building purposes, and the value of a marble block was in proportion to its freedom from flaws and chips. The jerrybuilders of those days (by-the-by they did not die childless) used up the defective blocks in erecting residences to sell at reducee rates and covered up the defects with a cement, of which white wax formed the chief ingredient. They looked just as stately as the others till an exceptionally hot sun melted the wax and revealed the fraud. Hence a perfect building was said to be "sine cera," or "without wax," and a friendship perfected by the trial of the fire of adversity was said to be "without wax." The signature "sine sera" as a symbol of genuine affection and probity has been used ever since, and many perpetuate it without knowing its origin and its import.

THE ONTARIO ASSOCIATION OF ARCHITECTS.

The Council of the Ontario Association of Architects has passed the following resolution:

"Whereas the Association is endeavoring, during the current year, to establish conditions of new activity and usefulness, and certain architects are in consequence desirous of becoming members of the Association without passing the examinations prescribed for students, be it therefore resolved that:—Architects who have not registered, nor passed the examinations prescribed by the Association, but who otherwise satisfy the requirements of the "Ontario Architects' Act," and who apply before December 31st, 1900, may be admitted without passing the examinations prescribed for students, if the Council after taking such steps as may be necessary to satisfy themselves of the qualifications of applicants, are agreed as to their fitness."

SOME ESSENTIALS TO HEALTH AND THE DUTY OF ARCHITECTS.*

By H. C. Lander.

The medical profession has done noble service in discovering and emphasizing the real safeguards against disease which are summed up in the word "cleanliness"—clean air, clean water, clean food, clean bodies, clean houses, clean habits—and in showing that a due allowance of sunshine and light and of all the other gifts of Nature are absolutely necessary for the proper development of human life and the prevention of disease. I have referred to what I may call this pioneer work of the doctors because I think there is an opening for similar work in the architectural profession.

The architect's influence may be felt in either or both of the two ways; first, in the particular buildings he erects and in his personal contact with his client; and, second, in a wider sense, in his power as a specialist to educate public opinion. The public are much more ready to accept a statement upon any subject made by a specialist than by anyone else. If any particular conclusion upon some point in relation to healthy dwellings was arrived at and insisted upon by any considerable number of architects, such opinion would carry very great weight.

But to return to his first sphere of influence. The architect has it in his power, either by bad planning and ignorance of sound principle in sanitation, or, on the other hand, by knowledge and skill in design, to influence very directly for good or evil the lives and the health of those who live or work in the buildings which he erects. The effects of bad planning are felt in the want of light and air and sunshine into living-rooms, schools and workshops; want of proper ventilation; in dampness arising from the ground; in placing the rooms with the wrong aspect; in dangers arising from the undesirable position of the sanitary fittings, as well as from the fittings themselves and the drains, together with the absorbent or otherwise insanitary nature of the materials of which the building is composed.

The great bulk of our lives is spent within doors, far too much time if health were the only point to be considered. We are born, bred and educated within doors, we eat and sleep and to a great extent earn our living and take our recreation within doors. The nature of the buildings in which we spend such a large proportion of our lives must have a very distinct influence upon the public health. Insanitary buildings—that is, those which by their construction or fittings in any way interfere with the needs of a natural and healthy life—are a source of public danger, and must be dealt with accordingly, whether they be public buildings or private houses. There are none better qualified than architects themselves to undertake this aggressive sanitary reform as applied to buildings, as doctors have undertaken similar work in the sphere of medicine.

The architect's duty does not consist merely in supplying the demands of the public or of commercial or other requirements; such a conception is degrading and narrow, and, if followed, would convert the architect into an ordinary commission agent. The architect is the professional adviser of his client, but he is something more even than that, or should be, as the medical man has a duty beyond merely attending to the needs of his own little circle of patients. Every true doctor has the public health at heart and the alleviation of the pain and suffering of humanity, and every true architect should have an interest in the public health outside and beyond the interest he takes in providing his own particular client with a healthy home or a well-ventilated church. The forward movement in the prevention of disease was not in answer to any public demand, but was undertaken upon their own initiation by the medical profession, and, in one sense, against their own private interests, since doctors live by curing disease, not by preventing it, and if architects are to take their share in assisting the movement, the initiative must come from within; at all events, I think we shall agree that this would be the more dignified course rather than to wait until such reforms in building regulations and customs as are necessary are demanded by the public or thrust upon us from without.

It is the right and the duty of the architect to use his influence by every means in his power to promote the public health in all those matters which come within the knowledge and scope of his work. If public prejudice is against him, he must seek to educate public opinion; if by-laws or other restrictions act prejudically in the interest of the public health, or if they need amending or abolishing, he must agitate and bring pressure to bear upon the proper authorities until such enactments are repealed, amended, or remodelled; and if private profit stand in the way of reform, he must uphold the principle that the greatest good to the individual is attained only through the well-being of the many, and that the maintenance of a high standard of public health is the best, and indeed the only, protection for the individual.

If we as architects were as much in earnest about raising the standard of public health as are the members of the sister profession of medicine, the progress made would be much more rapid than it is, and the influence of the architect would be much greater, both as adviser to the client in each particular case, and as an advocate for improvement in all sanitary legislation.

In these days when so many things are said and done in the name of patriotism which had better have been left undone and unsaid, we need not remind ourselves that true prosperity comes only through the dignity and happiness of the lives of the people, and that those conditions which promote the fullest and most vigorous life amongst the greatest possible number are the only true bulwarks of a country's greatness, and that any ideas of power founded upon a basis which places the life or health of its citizens in a position of secondary importance is a standing danger to any country far greater than any possible combination of external forces.

In lowering the death rate and in raising the standard of health and physique, of manliness and endurance, amongst the sons of the nation, we are doing no mean service, and yet these things are to a great extent possible only under conditions which come within the scope of an architect's work and knowledge, and upon which he should, therefore, surely have something to say.

* Abstract from a paper read before the Discussion Section of the Architectural Association, May 18th, 1900.

PERSONAL.

Mr. Wm. Rae, architect, of Toronto, was united in marriage last month to Miss Georgina Leaycroft, of Quebec. The ceremony took place in the chapel of St. John's Church, Toronto. Following the wedding reception Mr. Rae and his bride crossed to Niagara en route to the United States, where the honeymoon was spent.

THE INTERCEPTING TRAP.

The frequency with which infectious diseases enter dwellings in the so-called choice residential districts of some of our cities, is calculated to weaken public confidence in the efficiency of the intercepting trap as a means of preventing the entrance of sewer gas into the house drainage system. Some of our most experienced and progressive sanitarians have openly proclaimed their belief that the intercepting trap is a humbug that ought to be abolished. The important bearing of this question upon the public health has led us to solicit the views of a number of well-known architects, engineers, plumbers and physicians, some of whose opinions are printed herewith, and others will appear in future numbers. In this way we hope to see the subject thoroughly ventilated, and the value or uselessness of the intercepting trap established.

Toronto, Aug. 7th, 1900.

Dear Sirs,—The entire absence of a trap in house drains is the ideal system. There are two difficulties in the way, however; the first is that the great majority of drain connections are now trapped; the second is that houses vary very much in height, so much so that the top of the soil pipe in one house might be below the level of the upper story windows in the adjoining house.

This would be a source of danger in the case of the wind blowing towards the higher house, and the danger would be especially great if but few houses were trapless, as the bulk of the sewer air would then pass through the drains and soil pipes of these houses, concentrating the sewer air in that certain locality.

If legislation could be obtained and abolish all traps and make the tops of all soil pipes extend above any window or future window, the scheme might be feasible.

Of course it would be very unsightly to have a tall outlet upon the roof of a low house, and we doubt if such a thing could be carried out.

Yours truly,
Burke & Horwood.

Toronto, Canada, Aug. 9th, 1900.

Dear Sirs,—Your circular letter of August 4th requesting my opinion on the subject of main traps on house sewer connections, duly received.

In a properly designed sewerage system, main traps are not necessary, and I am now, after several years residence in Toronto, of the opinion that in the combined sewerage systems the main traps should be abolished.

The so-called "breathers" which are so prominent a feature in the front lawns of Toronto and in many other places that have followed Toronto's example, are in my opinion a menace to the health of the citizens. The only practical method of properly ventilating street sewers is through the house soil pipes, each of which should have a free opening from the main sewer to a point above the roofs of the buildings.

In 1888 I advocated the abolition of main traps on house sewers, and I succeeded in inducing the town of Brockville to adopt my recommendation, although at that time I believe I was the only engineer in Canada who advocated so radical a departure from the old method. The Brockville system has now been in operation for twelve years and has proven entirely satisfactory. The sewer system is well ventilated by means of the house sewers notwithstanding the fact that the manholes are completely closed over by ice and snow during the winter months.

The Brockville system was followed at Brantford, Barrie, Berlin, Waterloo, Toronto Junction, Renfrew and some other places in Ontario, and there can be no question now as to the merits of this method of ventilating sewers and house drains.

In the Toronto system neither the house drains nor the main sewers are ventilated. Manhole gratings cannot ventilate a sewer system, neither will stacks or chimneys built along the line of sewer.

The so-called sewer gas should not be produced in a properly constructed and properly ventilated sewerage system, and the foul smells so offensive in many of the cities are unknown in Brockville, Brantford, and other places where the separate system has been adopted and main traps on house drains omitted.

You will see from the foreguing letter that the omission of the main traps is nothing new, having been omitted for the last twelve years.

Truly yours,
Willis Chipman.

Toronto, Aug. 9, 1900.

Gentlemen,—In reply to yours of the 4th inst. regarding the question of ventilating sewers through the private houses by the omission of the main trap, I think a great deal can be said in favor of this scheme, under proper restrictions. I am of opinion that it would be necessary to have all of the pipe inside the street line of iron, and laid very carefully under rigid inspection. Under these conditions a portion of the sewer gas would probably find its way out through the ventilating pipe at the top of the houses, but the greater portion would probably still follow the lines of least resistance, and pass in or out of the manhole gratings in the centre of the street. As, however, the private drains of this city are practically all laid and are very numerous, it is not practical to make the change at this date, especially as the sentiments of the people would probably be against having a direct ventilation of the sewer through their houses, no matter how well it may be done and no matter how safe it may actually be.

Yours truly,
C. H. Rust,
C.B.S. City Engineer.

Toronto, Aug. 9th, 1900.

Sirs,—In response to your request I am glad to express my opinion as to the advisability of omitting the trap from private drains at connection with street sewers.

On all work done in accordance with modern usage that trap, with its hideous "breather," is not only useless to the house plumbing, but an evil to the street sewer, in retaining gases which would harmlessly escape through the thousands of soil-pipes if permitted.

You refer to the suggestion as new, but I beg to remind you that for many years I have been its earnest advocate, and have practised as I preached. In each case I have to repeat the same arguments with plumbers, drain men and owners, but always prevail, and never use the trap.

In former years I have interviewed the mayor, aldermen and city engineer, and have published my views in the daily press and your excellent journal.

On the whole, our by-laws are thorough, but on this one point we are behind other cities whose more recent by-laws prohibit the trap, but of course require the iron soil pipe continued to outside of building.

In the old days of putty joints, no break syphons, and sheet metal or no vent pipes, the trap was a needed though only partial safeguard; in some cities better than here because of having a back vent pipe carried to the roof. But now that we insist on perfect plumbing, with a back vented trap on every fixture, the old danger is avoided, and every soil pipe should help to ventilate the sewer. Then there would be no confined sewer gas, because the fresh air would enter by the street gratings, and, being warmed, would freely escape out of the high soil pipes. At present the confined air becomes poison-laden, rises to the higher parts of the city and escapes by the only outlets, the street gratings, over which children may be seen playing, and to which I would trace the outbreak of diphtheria in those localities a few years ago.

High chimneys have been proposed as a relief at certain points, but why add expense and ugliness when the thousands of soilpipes are available gratis?

At a recent convention of sanitary engineers here an able paper was read advocating the omission of the trap, but I failed to note its unanimous endorsation at the time.

Trusting that your efforts may result in complete reform,

I am, respectfully yours,
M. B. Aylesworth.

24 Sullivan St., Toronto, Aug. 14, 1900.

Dear Sirs,—In answer to your letter of August 4th, if you mean all traps I don't think it is worth considering; if you mean the main trap only there might be some arguments in its favor, such as better ventilation of main sewer, for without main trap the current of air would be down manhole and out through soil pipe terminus. This is about the only argument in its favor,

while against it you have sewers too large, for if this was to be adopted we should have two sewers, one for sewage and one for storm water. Chances of sewer air to enter houses and buildings from various causes, some of which are: traps of fixtures becoming unsealed by evaporotion, capillary attraction, defects in material of trap, or in some cases owners running water to protect them against frost while building is vacant, or should some break-syphon become choked and allow trap to syphon.

Allowing that some of the traps have become unsealed and soil pipe terminus becomes choked from hoar frost, sewer air must enter the house as it cannot escape otherwise. Then again, when buildings are of uneven height, one soil pipe of a low building may be discharging sewer air under a window of a tall building, and it would be useless to run long lengths of pipe above the roof as they would close up with hoar frost. These and many other reasons might be called disadvantages, and the one or two in its favor called advantages—should they be placed in the scales, the omission of main trap would not be in it. Even allowing that some of the beforementioned disadvantages might be present when main trap is in drain, you would only have your own sewage to contend with, and should building become vacant there would be no sewage, and storm water would keep main trap sealed. Some people claim that main trap becomes foul; this should not be if trap is made and set properly, for there is the same amount and sometimes more water to keep it clean than keeps the drain clean. All things considered, I think it very bad policy under the circumstances, to omit main trap.

W. H. MEADOWS,
Plumbing Inspector.

MONTREAL, Aug. 13th, 1900.

DEAR SIR,—In answer to your enquiry re the advisability of placing a trap at the entrance of the drain or soil pipe into the building I would say that it is desirable as a preventative from sewer gas entering the house through any leak in the joints of the soil pipe. Of course there must at all times be an air inlet on the house side of the trap so as to allow a free flow of air through the soil pipe and thus procure ventilation of the pipe.

If all soil pipes of a town run through the roof and have all their joints secure the trap can be dispensed with and thereby procure ventilation of the sewers over the housetops and also save the cost of the trap. There is also no doubt that the simpler the drainage system is made the better and more efficient it is, and less chance of syphonage, provided that it is sanitary.

In the event of the trap being done away with I would suggest that all drainage be placed under a compulsory pressure test, as neither the smoke or peppermint test are altogether satisfactory in my opinion.

Yours truly,
J. RAWSON GARDINER.

MONTREAL, Aug. 13th, 1900.

DEAR SIRS,—I have always insisted very strongly on the necessity of an intercepting trap between the house and the main sewer and then thoroughly aerating the house system by fresh air inlets and the house soil pipe, carried the full diameter, up to three or four feet above the top of roof. I do not object to water and illuminating gas being laid on to the houses, but I decidedly object to lay on sewer gas also.

If the main drainage system was properly and sufficiently ventilated there would not be so much need of the intercepting trap, but I know of no system which does this perfectly, and we certainly have not got it in Montreal.

Very truly yours,
ANDREW T. TAYLOR.

Mr. J. W. Hughes, the well-known plumber of Montreal, refers us to his views on this subject expressed, as chairman of a committee on sanitation, in a report to the American Health Association. This report, which deals with the subject in a clear and comprehensive manner, is as follows:—

SEWER VENTILATION.

Any of the special subjects mentioned in the foregoing title of a special committee appointed at the last annual meeting of the American Public Health Association are of sufficient importance to merit the attention of a special committee, but they are at the same time so intimately connected one with another that they cannot well be separated, as plumbing calls for drainage and both for ventilation. An exhaustive treatment of any one of the combined subjects would require a volume and be unsuited to the purpose of our convention; therefore I will confine myself to one portion, namely, the ventilation of the plumbing system of a building, or more correctly, that part of a plumbing system that serves for the conveyance of the house wastes known as sewage and that are to be finally disposed of as far as any particular building is concerned, when they reach the public sewer.

It has for some time been accepted as an imperative requirement of a properly planned plumbing system that provision be made for a free circulation of air at all times through not only the main internal sewer of a building but also through the smaller branches known as the waste pipes; in other words, that there be no dead ends, but that each and every part of a properly planned system of sewers for a building be constantly swept by a current of air, and carrying out this principle, provisions are made in the planning of up-to-date public sewerage systems for the ventilation of same. The private sewers and waste pipes of a building, forming as they do but a part of the general system should, in my opinion, be treated as a part of the whole, and the attempt to cut them off as is done by fitting what is known as the intercepting trap is a mistake. First, because it interferes with the basic principle of the water carriage system for the disposal of sewage, which is that the sewage should, in the most rapid manner possible and without obstruction, be carried from its source to its destination, yet the advocates of the intercepting trap place an obstruction (in other words a miniature cesspool) just at the point where it will do the greatest possible injury, and obstruct the rapid carrying away of the sewage, and defeat at the start the main principle on which the system is based, namely, the rapid removal of sewage and its carriage, by an ample supply of water, to its destination.

The advocates of the intercepting trap claim that the improved forms of this cesspool offer very little obstruction to the flow. Such a contention is absurd, as if they did not obstruct the flow, catch and hold the sewage, they would not be traps. Again it is claimed that the improved traps are continually washed out or scoured. To a certain extent this is true as compared with the older forms, but let any one who has had occasion to open the cleaning eye of one of these traps, that has been for some time in use, speak of the conditions found, and he must tell of stored up putridity, sickening odors, and a condition of things unsanitary, not to be found even in the main sewers of the streets, and certainly not to be found in any other portion of the pipes in a building where the sewage has had an unobstructed flow. My second charge is, that it completely defeats any effectual general system of sewer ventilation by preventing free circulation of air through the whole system of main sewers, and that part of them consisting of the building sewers. To offset this in part, what is known is the fresh air inlet is placed between the intercepting trap and the building. This is a pipe brought to the surface and fitted with a suitable terminal. The proper name of this pipe is a "stink outlet," as when a fixture is used, the rush of water from it must force a portion of air out of the air inlet, and then it of necessity becomes a stink outlet, and as a rule in cities this pipe must be so placed as to make it a dangerous nuisance either to the wayfarer, or if at a distance from the footwalk, to the inmates of the building with which it is connected, as the foul air escaping from it gains access to the building it is proposed to protect, through doors and windows. "But," says the advocate of the intercepting trap, "would you advise arranging pipes so that the air of the street sewers would have free passage through the pipes in a building?" To this my reply is, yes. And there is no other safe plan. People who live in populous districts must bear, each and every one, his part of the risks as well as share the benefits of the whole. No one living under the conditions imposed by the concentration of large masses of people on a limited area can escape, and the principle of the greatest good to the greatest number must apply. The advocates of the intercepting trap do not deny the necessity of sewer ventilation, but they attempt to provide for it in detail instead of as a whole, and so defeat the object they wish to attain. They will tell you that the street sewers must be ventilated by having perforated manhole covers placed at regular intervals along the line of street sewers—that is, cut off the house from the street sewers, by means of the trap, but let the main sewers have free and open connection with the street.

Now as the streets of a town are the sources from which the buildings derive their greatest supply of fresh air, my claim is that such a course is wrong and insanitary. Given pure air in the streets and there must be pure air in the buildings—local cause of air pollution being, of course, excepted. Do away with the trap on the private sewers; continue the interior sewers of the building full size through the roof, carrying them to a sufficient height to be well above adjacent windows, then there will be a natural circulation of air through the entire system of both public and private sewers, and the outlet from the sewers which is acknowledged to be a necessity, will be above the general line of the house tops and not at the street level as is the case when the intercepting trap is adopted. The higher temperature of the pipes passing through the building, especially in the cold season, will insure this circulation at the time when it is most required. Of course there are exceptions to all rules, and there are no doubt in all cities certain places where the local conditions would call for the placing of a trap in the private sewer; such cases call for the exercise of the skill and experience of the practical plumber and sanitary engineer. It is no more possible to lay down a rule covering every possible contingency called for in scientific plumbing and ventilating, than it is to apply fixed rules to the practice of medicine. If it were there would be little need of skilled and experienced physicians. The principles of scientific medicine and plumbing are fixed, but the application of these principles calls for the intelligence acquired by education and developed by practice.

Much injury has been done by attempting to frame plumbing by-laws that would apply to every case. The conditions vary in almost every building, and to adapt the principles to the special requirements requires not only practical but scientific knowledge. If the American Public Health Association would make a study of the general principles covering this question and embody them in a code having its endorsation, leaving the practical application of these principles to those whose special duty it is to apply them, much good would result. In conclusion, conditions exist in northern climates during that portion of the year when snow is on the ground that completely neutralize the effect of the perforated man hole covers over the street sewers, and during such time, in cities where the intercepting trap is in general use, the main sewers are without ventilation, and a serious condition of affairs exists, as the buildings being heated to a greater degree than the outer air has a cupping action, and draws the air from the sewers into them, beneath the frozen and almost impervious top soil and paved roadways where the soil is porous. This is sure to occur, even when the buildings are situated a considerable distance away from the main sewers.

Sewers breathe! Under certain conditions the air will rush into them, again it is being expelled with considerable force. Atmospheric conditions partly account for this, but the varying quantities of solid and liquid matter constantly entering and leaving them has an important bearing on the question. Such being the case proper breathing places must be provided, and any attempt to bottle up the sewer air will end in failure, and what place so suitable as above the roofs of the buildings, where the wind will disperse the foul gases and the light and air disinfect them.

LEGAL.

THE ASBESTOS AND THE ASBESTIC COMPANY VS. THE W. SCLATER CO., LIMITED.—The petitioner alleged that it acquired from the Danville Asbestos and Slate Company, and are owners of, asbestos mines, situate in the township of Shipton; that on the 5th July, 1899, the company transferred and assigned to the petitioners a trade mark obtained by the former and registered on the 3rd February, 1896, which trade mark has the words Asbestic Wall Plaster surmounting a trowel, on which was inscribed the letter A; that the respondents have been, and are, in violation of law, using the words of the trade mark, and are selling what purports to be an asbestic wall plaster stamped and labelled as such; that respondents thereby induce the public to believe that they are buying a product of the petitioners; that petitioners have extensively advertised their product and have established a large and lucrative business in selling asbestic wall plaster and have acquired a right of property in said words. The petitioners prayed for an injunction to restrain the respondents, and their agents from further selling any goods or materials under the name of asbestos wall plaster, and that the respondents be condemned to pay $1,000 damages. The plea was to the effect that the petitioners, could not by the said alleged trade mark, obtain the use of the works asbestic wall plaster, and the Government of Canada could not give petitioners the sole right to use said words; that respondents had sold asbestic wall plaster long previous to the 3rd February, 1896, and since, and have the right to make use of the works "asbestic wall plaster," the word asbestic being merely an indication and description of the article sold by respondents. The plea was maintained and the action dismissed by the Superior Court of Montreal.

KELLY VS. SUTHERLAND.—The plaintiff brought action in the courts at Montreal, for $910 balance alleged to be due for work done by the plaintiff for defendant in connection with the construction and alteration of a building upon a property belonging to the latter, under a contract of date 8th October, 1897, which work the plaintiff alleged was completed and accepted on the 20th December, 1897, at which date there was due to him a balance of $1,000, for which sum he, on the 15th January, 1898, registered, with defendant's consent, a builder's privilege upon the property whereon the building was erected, viz., on the northeast portion of lot 791, St. Lawrence ward. The plaintiff in consequence, besides praying for a personal condemnation against the defendant, concluded hypothecarily tor the abandonment of the property. The defendant pleaded denying his alleged ownership of the property in question, or possession of it as owner, denying, further, that plaintiff finished the work under the contract alleged, or that the defendant at any time owed him anything, and alleging that under the contract the plaintiff was paid from time to time as the work progressed; that up to the 20th December, 1897, he had been paid $925, and up to the 15th January, 1898, $1,300.39, which sums much exceeded the value of the work done up to that date; that the privilege alleged was registered with defendant's consent, but merely as a means of enabling him to borrow money, he at the time owing the plaintiff nothing; that about the 18th April, 1898, the plaintiff having then done work under the contract not exceeding in value $1,250, and having received $1,590.69 in cash, besides $132.62 in goods, making in all $1,723.31, refused to proceed with and complete the work thereunder, and the defendant was compelled to complete it himself at a cost of $515.96, making a total expenditure by the defendant over and above the contract price of $289.27; that, moreover, any claim that plaintiff could have was compensated by the sum of $132.62 due by him to the defendant for goods sold; that plaintiff's work was not acceptable, but done in an unskillful and unworkmanlike manner, and would as to a large part, have to be renewed at great expense, for which the defendant reserved his recourse. To this plea the plaintiff answered, denying its allegations, and alleging that he only abandoned the works in question because the defendant, though duly protested, refused to pay him in accordance with the contract; that any goods he ever bought, he bought not from the defendant, but from A. Sutherland & Co., and paid for them in cash; that when plaintiff abandoned the work, it was in good order and condition, and there remained to be done work not exceeding in value $150. The court proceeded to appreciate the evidence as to the different items of the plaintiff's claim, and came to the conclusion that the plaintiff had established his demand to the extent of $235.75, tor which amount judgment was entered in favor of the plaintiff, and the privilege was maintained.

FOLIATED ARCHES.

From the invention of the arch to the middle of the eleventh century no other form of it was used except the semi-circular and segmental. About this period license was taken to alter the forms of arches; the pointed arch was introduced, and with it a variety of other forms, as ogees, horseshoes and ellipses. At the same time there came in the practice of foiling arches—that is, of uniting a series of three or more by their bases so as to form one, which is termed a trefoil, quartrefoil, cinquefoil, and so on, according to the number of its component arches or foils, as they may be termed. These foils may be either of the same or different forms, but are generally of an odd number, with one in the centre and the rest disposed in similar pairs on each side of it. They are often all circular or all pointed, and sometimes all ogees. An ogee or pointed between two circular foils is a very common arrangement; the lower pair are commonly imperfect semi-circles, from their being continued downwards to form the sides of the arch, but in some of the earlier examples are made complete semi-circles. The pointed arch, from its united strength and convenience, of course, assumed the prominent place, and was used in all the larger and essential parts of the fabric, while the other forms were reserved for the decorative arcades, the galleries, doors and windows. These arches when at first introduced were treated in composition exactly in the same manner as the circular arches had been, and were mixed with them. The other characteristics of the Pointed style were invented before or after their introduction, and may be traced from their first imperfect germs to their final perfection entirely amongst European buildings, so that the notion of the Pointed style being introduced complete is at any rate erroneous.

Branch Office of the CANADIAN ARCHITECT AND BUILDER,
Imperial Building.

MONTREAL, August 15, 1900.

ARCHITECTURAL INSTRUCTION AT MCGILL UNIVERSITY.

The annual calendar of McGill University, Montreal, states that during the session of 1900-1901 special courses of lectures will be given in connection with the Architectural Department, by Messrs. E.E.S. Mattice, B.A. Sc. (McGill), and M.C.J. Beullac, R. Sc. (University of France), of the Dominion Bridge Works, on the following subjects :

1. Building materials ; the history, properties, tests and uses of all materials of construction.

2. Specifications and professional practice: The different methods of preparing specifications for estimates, instructions to bidders, and rules to be observed in writing specifications, general clauses, law of contracts.

3. Building Construction : (a) Carpentry ; frames, joints, framing of floors and roofs, partitions, bridging, furring, etc ; (b) Slow burning construction ; (c) Masonry.

4. Hygiene (a) Plumbing ; (b) Disposal of household refuse ; (c) Heating : (d) Ventilation.

5. Steel frame buildings : Design, millwork, steel and cast iron columns and connections, beams and girders, framing and wind bracing.

Special designs will be prepared in the drawing-room illustrating the several subjects of the lectures.

A course of lectures on "The Elements of Building Construction and Foundations" will be given by Professors Capper and Lea, in connection with the course in civil engineering and applied mechanics. These lectures will treat of : (a) Brick and stone masonry ; (b) Timber framing—flooring, beams, columns, centering, etc ; (c) Iron and steel framing—girders, columns, etc ; (d) Fireproof and slow burning construction ; (e) The bearing power of the various soils, rocks, etc., as they occur in nature ; (f) The stability and character of the underlying material at any given site, taking into account the effect of frost, erosion, etc ; (g) The construction of different kinds of foundations, both on land and in water, by piling, dredging, coffer dams, open and pneumatic caissons, freezing, etc.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

The half-yearly examinations of the P. Q. A. A. were held at the Association's rooms, 112 Mansfield St., Montreal, July 18, 19 and 20, 1900.

The following candidates came up for their final examinations ; Edward B. Staveley, Quebec ; G. W. Northwood, Ottawa ; Frank Peden, Montreal ; O. Huvt, Montreal ; also for preliminary examinations : L. Auger, Levis, Que ; Geo. L. Rapolle, Quebec ; J. Scott, Montreal ; Eug. Lalonde, Montreal ; Louis Labelle, Montreal ; Michael Levesque, Montreal ; Jas. E. Boyne, Montreal ; Geo. H. Wilkins, Montreal.

The results of the examinations have not been given as yet, but will be printed in the next issue of this paper. The next examination will be held in Quebec city January 16, 17 and 18, 1901.

The annual meeting of the P.Q.A.A. will be held in Montreal on the 3rd and 4th of September. Arrangements are being made to hold an architectural exhibition in connection with the convention.

The Association have adopted and had printed the following schedule of charges :

No. 1.—Schedule of charges to be made by members of the Association shall be as follows :

No. 2.—For plans, specifications, working drawings, and superintendence, on all classes of buildings, except such as are hereinafter excepted, a commission of 5 per cent. (5%) on the total cost of the work.

No. 3.—On three houses of similar design and on single stores and warehouses, four per cent. (4%).

No. 4.—On four or more houses or two or more stores or warehouses of similar design and on all factories, three per cent (3%).

No. 5.—Partial charges to be as follows :

I.—For preliminary studies, sketches, one-fifth (1/5) of the above charges.

II.—For complete plans and specifications, including the preliminary studies, one-half (½) of the above charges.

III.—For details, one-fifth (1/5) of the above charges.

IV.—For superintendence of works when drawings are not furnished, two and one half per cent (2½%) on the cost of the works.

No. 6.—For work in alteration of premises, the amount of commission to be seven and one-half (7½%).

No. 7.—For work in which the expenditure is mainly for skilled labor, namely : For monumental work, fittings and furniture, and for decorative work, stained glass and such like, the commission to be ten per cent. (10%) on the outlay.

No. 8.—Travelling expenses, including time lost in travelling, to be paid by the client, if the work is executed at a distance.

No. 9.—Valuations of property requiring measurements and a detailed estimate, where the value does not exceed $5,000, one and one-half per cent. (1½%). Where the value exceeds $5,000 the commission to be one and one-half per cent. (1½%) on the first $5,000, and one per cent. (1%) on the remainder.

No. 10.—All works, studies, consultations and proceedings that are not covered by this tariff shall be remunerated according to the "quantum meruit."

No. 11.—Drawings and specifications are the property of the architect, who only lends the drawings and specifications.

FOUNDATION AND EARLY HISTORY OF M'GILL UNIVERSITY.

McGill University has a special interest for architects and engineers because of its splendidly equipped Architectural and Engineering Departments. The accompaning concise description and early history of this now famous institution is reprinted from the Annual Calendar :

"Almost alone in this respect among Canadian colleges and universities, McGill University owes its origin to a private endowment. Its founder, the Hon. James McGill, from whom the University takes its name, was born on the 6th October, 1744, in Glasgow, Scotland, where he received his early education and training. Emigrating to Canada before the American Revolution he engaged in the North-West fur trade, then one of the leading branches of business in Canada. Subsequently he settled in Montreal, and, in partnership with his brother, Andrew McGill, became one of its leading merchants, distinguished for his public spirit and his exertions for the advancement of the city. He was lieutenant-colonel and subsequently colonel of the Montreal City Militia ; and, in his old age, on the breaking out of the American war of 1812, he became brigadier-general, and was prepared to take the field in defence of his country. He also represented the West Ward of Montreal in the Provincial Legislature, and was afterwards a member of the Legislative and Executive Councils. Cultivating and enjoying the society of the few men of learning then in the colony, he took a special interest in the establishment of an educational system in the Province of Quebec. By his will, bearing date the 8th January, 1811, more than two years before his death, which happened on the 19th December, 1813, he bequeathed his property of Burnside and a sum of £10,000 in money to found a college in a provincial university, the erection of which had already been provided for by the generosity of the British Government. Three leading citizens of Montreal were appointed trustees under the will, and were directed to convey the subject property of the bequest to the Royal Institution for the Advancement of Learning, a body which, in 1802, had been incorporated by the Legislature "for the establishment of Free Schools, and the Advancement of Learning," in the Province of Quebec. The conditions upon which the property was to be transferred to the Royal Institution for the Advancement o Learning were, mainly, that the Institution should, within ten years after the testator's decease, erect and establish on his Burnside estate "an University or College, for the purposes of education and the advancement of learning in this Province," and that the college, or one of the colleges, in the University, if established, should "be named and perpetually be known and distinguished by the appellation of McGill College." Owing to persistent opposition by the leaders of one section of the people to any system of governmental education and to the refusal by the Legislature to make the grants of land and money which had been promised, the proposed establishment of the provincial university by the British Government was abandoned.

"In so far as the McGill College was concerned, however, the Royal Institution at once took action by applying for a Royal Charter. Such a charter was granted in 1821, and the Royal Institution prepared to take possession of the estate. But, owing to protracted litigation, this was not surrendered to them till 1829. Commencing then the work of teaching with two faculties, Arts and Medicine, the record of the first thirty years of the University's existence is an unbroken tale of financial embarrassment and administrative difficulties. The charter was cumbrous and unwieldy, and unsuited to a small college in the circumstances of this country, and the University, with the exception of its medical faculty, became almost extinct. But after thirty years the citizens of Montreal awoke to the value of the institution which was struggling in its midst. Several gentlemen undertook the responsibility of its renovation, and in 1852, an amended charter was secured. The Governor-General of Canada for the time being, Sir Edmund Head, became interested in its fortunes, and in 1855, with the advent of a new Principal, an era of progress and prosperity began."

HARMONY AND CONTRAST IN COLORS.

THE Upholsterer gives the following list of colors which contrast and harmonize :—

White contrasts with black and harmonizes with grey.
White contrasts with brown and harmonizes with buff.
White contrasts with blue and harmonizes with sky bue.
White contrasts with purple and harmonizes with rose.
White contrasts with green and harmonizes with pea green.
Cold greens contrast with crimson and harmonize with olive.
Cold greens contrast with purple and harmonize with citrine.
Cold greens contrast with white and harmonize with blues.
Cold greens contrast with pink and harmonize with brown.
Cold greens contrast with gold and harmonize with black.
Cold greens contrast with orange and harmonize with grey.
Warm greens contrast with crimson and harmonize with yellow.
Warm greens contrast with maroons and harmonize with orange.
Warm greens contrast with purple and harmonize with citrine.
Warm greens contrast with red and harmonize with sky blue.
Warm greens contrast with pink and harmonize with grey.
Warm greens contrast with white and harmonize with white.
Warm greens contrast with black and harmonize with brown.
Warm greens contrast with lavender and harmonize with buff.
Greens contrast with colors containing red and harmonize with colors containing yellow or blue.
Orange contrasts with purple and harmonizes with yellow.
Orange contrasts with blue and harmonizes with red.
Orange contrasts with black and harmonizes with red.
Orange contrasts with black and harmonizes with warm green.
Orange contrasts with olive and harmonizes with warm brown.
Orange contrasts with crimson and harmonizes with white.
Orange contrasts with grey and harmonizes with buff.
Orange requires blue, black, purple, or dark colors for contrasts and warm colors for harmony.
Citrine contrasts with purple and harmonizes with yellows.
Citrine contrasts with blue and harmonizes with orange.
Citrine contrasts with black and harmonizes with white.
Citrine contrasts with brown and harmonizes with green.
Citrine contrasts with crimson and harmonizes with buff.
Russet contrasts with green and harmonizes with red.
Russet contrasts with black and harmonizes with yellow.
Russet contrasts with olive and harmonizes with orange.
Russet contrasts with grey and harmonizes with brown.
Olive contrasts with orange and harmonizes with green.
Olive contrasts with red and harmonizes with blue.
Olive contrasts with white and harmonizes with black.
Olive contrasts with maroon and harmonizes with brown.
Gold contrasts with any dark color, but looks richer with purple, green, blue, black and brown than with the other colors. It harmonizes with all light colors, but least with yellow. The best harmony is with white.

Concrete impervious to water can be obtained by paying careful attention to three conditions. These are fine grinding of the cement, balanced broken stone or gravel and thorough mixing so as to eliminate all voids, it being assumed that the proportions are such as to permit the latter condition to be reached.

EDUCATIONAL WORK OF THE ONTARIO ASSOCIATION OF ARCHITECTS.

Special interest attaches to the report of the Committee on Education, which has been presented to the Council. In this report it is recommended that students be required to pass matriculation before entering an architect's office and to be then articled for a period of five years. As an alternative, students may take the full architectural course (three years) at the School of Practical Science, and will then be required to serve only three years in an architect's office, one of which years may be served during the vacations of said school.

The report also recommends that the course of study for students include three distinct branches. The first of these, the scientific course, would embrace the scientific subjects included in the regular three years' architectural course at the School of Science.

For the students who are articled for five years, a plan has been arranged by which the necessary lectures may be spread over the five years of their studentship and may be attended by obtaining leave of absence from office work, for an average of eight hours a week during the school term. Of course, this plan is practicable only for students in Toronto ; for those at a distance the regular three years' course at the school is recommended.

The second branch of study represents the business or craft training. This includes those subjects in which the student may be expected to become proficient in the course of his regular office work, supplemented by the study of technical books as recommended.

The third branch comprises the course of study in design. For this it is recommended that the "Atelier" or studio system, which has proved so successful elsewhere, be adopted, and that a three years' studio course be instituted, occupying three months in each year. This studio work is to be under the supervision of practising architects.

The following is the outline of the full five years course as recommended by the committee. The subjects marked "A" are the scientific subjects ; "B" the business course, and "C" the studio course. It is proposed to hold examinations each year in courses "A" and "B," and in the studio work a progression by members will be required.

I Year.—"A." Analytical geometry, euclid, trigonometry, algebra, history of architecture, chemistry.

II Year.—"A." Calculus, history of architecture, dynamics, statics, descriptive geometry. "B." Elements of construction, technical terms (as applied to practical architecture), practical knowledge of building trades.

III Year.—"A." Descriptive geometry, heat and optics, strength of materials, applied chemistry. "B." Practical knowledge of building trades, foundations, structural iron work. "C." Preliminary studio work (drawing of classic detail and shadows).

IV Year.—"A." Hydrostatics, mineralogy and geology, constructive design. "B." Steel and iron construction, nature and properties of materials. "C." Studio work.

V Year.—"A." Hydraulics, compound stress, mineralogy and geology, applied chemistry, sanitary science. "B." Architectural jurisprudence, practical heat and ventilation, practical sanitary science. "C." Studio work.

This report has been received by the Council and the general trend of it approved. But it is not finally adopted, and in the meantime the regular curriculum is to be adhered to by registered students. One of its most important features, the studio work, it is proposed to inaugurate at once by starting classes in the new Association rooms in September or October. It is also hoped that an arrangement will be made with the Schoo

of Science authorities, under which, students desiring to do so, who are at present engaged in architects' offices, may attend the lectures as suggested in the report.

It may be said that these new features in the Association work will be in the nature of an experiment, to see how far they meet with the approval of architects and students and it is sincerely hoped that the efforts now being made to raise the standard of student education may be generally endorsed by the profession.

HOUSE DRAINAGE AND INSPECTION.*

By H. C. Bascombe.

I should wish to place before you the gist of 25 golden sanitary rules which I had the honor to assist in preparing prior to my commencing life as a public sanitary officer, and during a pupilage of seven years under the well-known sanitarian, the late Henry Masters, architect and surveyor, of Bristol :—

1.—Let it be remembered that foul air from drains or pipes, or damp walls, will, sooner or later, promote disease.

2.—If you discover that rats have gained access to premises, rest assured that sewer gas follows in their track.

3.—If it is found that the drains from a house are connected with the sewer or cesspool, the chances are that, upon examination, you will discover that foul air from the sewer or cesspool passes into the house through some defect existing in connection with such drains.

4.—If you discover that a main trap exists between the house and the cesspool or sewer, be sure that the fitting is so ventilated that any foul air from the cesspool or sewer (if it is forced or otherwise passed through the waterseal of the trap) be not drawn into the system of your house drains.

5.—On visiting premises, be very suspicious of the drains. If the pipes are too large to be readily flushed by the water at command, recollect that a bucket of water suddenly discharged into the drain has more effect in cleansing it than the ordinary water tap running the whole day.

6.—Never allow a drain to be laid under a house if you can possibly keep it outside the four walls.

7.—Ascertain that the well or underground water tank gives the drains a very wide berth.

8.—Beware of an unventilated sewer or underground water tank.

9.—Beware of having in or about the house a drain, cesspool or water tank that is hermetically sealed.

10.—If you find a drain trap in the cellar or dark room, rest assured that, sooner or later, the water seal will evaporate, and foul air escape through the trap into the house.

11.—If you find a pipe in or about the house for conveying soil or water in the form of a syphon, you may depend that at times such pipe will be affected by syphonic action ; the trap water will pass down its long leg, and thus foul air will gain access to the house through the broken water seal.

12.—Recollect that, in the act of discharging a closet, bath or lavatory, the descending waste water has a tendency to suck or force out the water seal of some other fitting.

13.—Bear in mind that every pipe discharging into the open is a duct for the admission of air into the house, and that such air is made foul by contact with the inside of such pipe, all waste pipes being coated inside with foul slime.

14.—Prevent all tanks used for the storage of water being fixed in a cellar, over a sink, or in a dark or inaccessible place.

15.—Ascertain that a current of air does not pass between the underside of the seat and the w.c. apparatus.

16.—Remember that the fats contained in the greasy water used for washing up dishes congeal in passing down the drain. Instruct the tenant, therefore, to discharge plenty of hot water into the sinks, especially the scullery fitting. In some cases it may be desirable to recommend a fat interceptor.

17.—Recollect that air in passing through a pipe is retarded by friction. Ascertain, therefore, that all pipes are of adequate size, and fixed without bend or angle, unless absolutely necessary.

18.—Don't forget that food in the process of cooling absorbs air, be that air good or bad. Ascertain, therefore, that the food supply is stored in pantries or larders free of air currents from polluted or doubtful sources.

19.—Ashes and vegetable matter, if mixed produce offensive odors. Instruct all tenants to deposit waste matter as far as possible from the dwelling, and to bank their fires during the latter portion of each day with all vegetable refuse produced upon the premises.

20.—If a gurgling sound is heard in a lavatory, sink or bath waste pipe, the chances are that foul air will shortly pass into the house by that particular fitting.

12.—Observe that the tendency of air is to pass into a house by way of doors, windows, cracks, and crannies. Ascertain, therefore, that the surroundings of a dwelling are free from offensive deposits or possible pollution of any description.

22.—If a w.c. is found to admit a foul odour, the sooner you recommend the owner to substitute a self-cleaning apparatus, the better for the health of the inmates.

23.—Instruct the tenants to caution their domestic servants to carefully discharge all slop water into the w.c. apparatus, in order to prevent the fouling of the floor or space beneath the seat and basin.

24.—Remember that, in drainage especially, "Nature abhors a vacuum."

25,—Bear in mind that "Cleanliness is next to Godliness."

*From a paper read before the Royal Institute of Public Health Congress at Blackpool, Eng., 1899.

ILLUSTRATIONS.

MANNING CHAMBERS, QUEEN STREET WEST, TORONTO.—E. J. LENNOX, ARCHITECT.

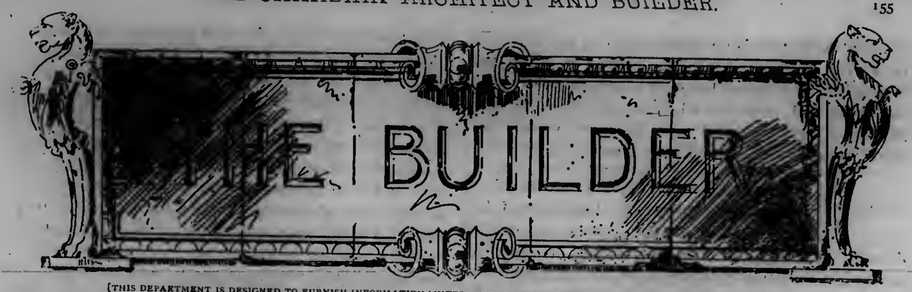
NATIONAL TRUST COMPANY'S BUILDING, KING STREET EAST, TORONTO.—GEO. W. GOUINLOCK, ARCHITECT.

DOOR IN THE PALAZZO VECCHIO, FLORENCE—(ILLUSTRATING ARTICLE IN THIS NUMBER, BY MR. W. A. LANGTON, ON "SHEET METAL AS SHEATHING.")

DETAILS OF MANNING CHAMBERS, QUEEN STREET WEST, TORONTO—E. J. LENNOX, ARCHITECT—(CHAS. LENNEX, MEMBER OF ARCHITECTS' EIGHTEEN CLUB).

CLEANING TRACING CLOTH.

Very few engineers or draftsmen, says a contemporary, seem to know that tracing cloth can be very quickly and easily cleaned, and pencil marks removed, by the use of benzine, which is applied with a cotton swab. It may be rubbed freely over the tracing without injury to lines drawn in ink, or even in water color, but the pencil marks and dirt will immediately disappear. The benzine evaporates almost immediately, leaving the tracing unharmed. It must, however, be borne in mind that the surface has been softened, and must be rubbed down with talc or some similar substance before drawing any more ink lines.



[THIS DEPARTMENT IS DESIGNED TO FURNISH INFORMATION SUITED TO THE REQUIREMENTS OF THE BUILDING TRADES. READERS ARE INVITED TO ASSIST IN MAKING IT AS HELPFUL AS POSSIBLE BY CONTRIBUTING OF THEIR EXPERIENCE, AND BY ASKING FOR PARTICULAR INFORMATION WHICH THEY MAY AT ANY TIME REQUIRE.]

Estimating Mason Work.

In making estimates for wrought stone-work, or stone-work in the wall, the following conditions must be considered. For plain ashlar walling and paxwint walling, the measurement must be super, net, for stuff and labor, the kind of tace and average sizes of stones, and bed considered, and allowance made where square blocks must be cut to suit shape of openings, moulded or ramped to torm curves. Reveals are always measured extra. Rubble walling up to 18 in. in thickness is generally measured superficial, or it may be measured cubic, as all over that thickness is. Other masonry is usually measured as described, labor and materials being kept separately, or when conducing to a better understanding of the work, as in strings and similar work, labor and material may be "figured" up by the running foot, making due allowance for work and number of joints, counting the ends, quoins and mitres. Work on chimneys, cornices, towers, spires, etc., requiring special appliances for hoisting, or at any considerable heights, or of extra dimensions, to be kept separate so far as material, hoisting, and setting are concerned, the labor of cutting being added whether being done by the day or by piece work. The cost of cutting and finishing mortising for lewis, bolts, etc., can only be estimated when the style of work and character of stone is known. The use of hoisting appliances of any kind must be charged for, according to the cost of such machines and the expense of running them, whether by hand, horse-power or steam. When measuring drawings for stone-work ample allowance must be made for cutting, so that each stone will exceed net dimensions from one to three inches in all its dimensions. This is an important item. In estimating for labor alone, the beds and joints of each block should be measured and accounted for, and where courses are similar, one accounting will serve for all. Where a number of window or door openings are alike, the figures for one window or one door opening will answer for all similar windows or doors. The various styles of work should be classified under different heads, and charged for accordingly, whether it be borted, tooled or polished, sunk, moulded, weathered, sunk and weathered, straight, raking, single or double curved, raised or sunk panelled, or plain. All circular work should have the material charged up as square blocks having sides equal to diameter of the work if such are columns, capitals, finials or other similar work. Segment work will require square blocks as large as the plan and section of the segment. Work to be paid for by "face measurement" should be girthed with a tape-line taking in all projections and indentations, and all corners should be taken at their greatest dimensions. Where a wall has two faces, that is, both sides finished, extra allowance must be made, if wall is built per cubic foot ; if built by "face measurement," then both sides of wall must count. Holes left for flues or for timbers of any kind should be charged for, as much time is spent in laying off and building in. The setting of window and door frames with the bedding thereof must be considerad, and charged up in accordance with their size, style, and position in the building. Window and door sills vary in size and style, and this must be seen to, the actual size and style ascertained before price is determined, when each kind may be figured on separately. Tracery or other intricate work should be considered separately, as the labor on such work nearly always exceeds the cost of material and requires more costly skill to execute each piece or class should be estimated by itself, independent of its surroundings. Columns should be girthed for circular work, with or without entasis, as the case may be, the latter being more costly than if parallel or straight taper, and flutes, for the labor, should be measured lineal, and number of stops counted and charged for ; if of an extra length, an additional percentage must be added to the cost. Cramps and dowels must be charged up, with average size and weight when of metal, and for labor and material if of wood or cement. Copings, when worked out of flags or thin stones may be measured lineal, or net when in place, including labor, cement, material and setting. Stairs or stone steps, with newels, balusters, and rail may be counted as complete, or they may be counted at so much per step, with rail, newel and balusters included, and all labor and material included. The cost, will of course, depend very much on the style and character of the work, which the estimator must consider. Landings, half or quarter spaces, or rests of any kind in stairs, may be measured per cubic foot which may include all joints worked, edges, soffits, mouldings, bases, plinths or other work, or they may be measured super with extra amount added to cover foundations, and other hidden work. It is better perhaps, to measure cubic and charge per foot. Mason work generally requires very minute sub-division in taking measurements for estimating, and an intimate knowledge of the various methods of working stone, in order to get at anything like a fair estimate of the cost of any piece of work that is enriched in any way. Each necessary operation of the workman should be taken into account, although it may appear that the same surface as in panelled and carved work, has to be measured more than once for different descriptions of work. The correctness of an estimate for stone work where there is much enrichment, will depend altogether on the knowledge of masonry possessed by the estimator, and

any contractor who is not experienced in the art should be wary of relying on his own figures in such cases, and as is done by many firms, it is always wise to consult the skilled workman when any doubt exists as to the cost of any particular piece of stone work. It is better to be sure than to be sorry afterwards.

Estimating Plastering.

Plastering is generally measured by the yard superficial. Openings of less extent than seven yards are not deducted. Returns of chimney breasts, pilasters or angles less than twelve inches wide, measure twelve inches. Baseboards, six or less inches wide are not deducted. In closets, add one-half to the measurement. Circular or elliptical work, charge two prices, and for domes or groined ceilings three prices. For each twelve feet in height add six per cent. extra. Cornices and centre-pieces in buildings more than eighteen feet high in the first story, should have five per cent. added to cover scaffolding and extra labor and time in getting material up. Centre-pieces, panelling and extra stucco work must be charged the regular prices for such work put in similar positions. Plaster brackets, consoles, rosettes, strap-work or other similar productions must be charged at current rates. Rough-casting on brick or stone in lime and fine gravel in two coats, should be charged at the rate of from 16 to 20 cents per yard, according to cost of materials and labor. Rough-casting on frame buildings, including all materials and lathing, two coat work, lathing diagonal double, should be charged up at the rate of from 26 to 30 cents per square yard. Plain cornices and mouldings, per inch girth and foot running, from 2 to 3 cents for each inch girth, so that a plain cornice measuring 15 inches girth must be charged from 30 to 45 cents per running foot, according to cost of material and rate of wages. This price also includes the dubbing out and putting up rough brackets wherever they are necessary and the extra lathing. All mitres over four in number, are to be charged each at the price of a foot running of moulding, except in halls or small rooms under 14x16 feet, then all mitres should be paid for extra. Lathing alone, laths and nails included, should not be charged less than 10 cents per yard super. Lath and plaster one coat material included, 17 cents per yard. The same set with fine stuff, 22 cents per yard. For two coat work, floated, 26 cents per yard. For two coat work, gauged in plaster of Paris, 30 cents per yard. If done in Portland cement, one of cement and three of lime mortar, charge 26 cents per yard for one coat work; if two coat work, charge 32 cents per yard. For rendering on brick wall, one coat with common mortar, charge 10 cents per yard; for two coats and set with fine stuff, charge 25 cents per yard. For coloured finish in stone, buff, salmon color, French grey, blue or lemon color, add 4 cents per yard to above prices. For lime washing in one coat, charge per one square (100 feet) 10 cents, if twice done, 20 cents per square; with whiting and size in one coat, 11 cents per square, for two coats, 21 cents per square. Scraping off old whitewash and stopping old walls to receive new wash, charge 15 cents per square. If the plaster is much broken, extra for putting on new plaster must be charged, and for this work about 3 cents per foot super must be charged for repairs of walls, and if color is to be matched, 4 cents per foot. For repairing ceilings, hacking off old plaster and putting in new, including scaffolding and material, from 4 to 6 cents per foot should be charged. If coloured to match ceiling, add another cent per foot; if gauged with plaster of Paris, add 1½ cents per foot. For taking down old plastering and lath, and removing rubbish to outside of building, charge 7 cents per yard, and extra if rubbish is removed to some distance from building. For taking down old scantling or rough casting and removing rubbish to outside of building, including wetting, dubbing out, and other necessary work in preparing wall for receiving new plastering, charge from 7 to 8 cents per yard. Taking down old plastering or lathed walls or ceilings without renewing the lathing, including renailing the laths where necessary and removing rubbish to outside of building, charge 6 cents per yard. Walls which are warped or out of line should be screeded by applying horizontal strips of plaster mortar 8 or 10 inches wide and 3 or 4 feet apart all over the surface. These screeds should be made to project out from the first coat and form gauges or working guides to fill up the hollow portions of the wall to. They must be taken out of wind and be plumb with the walls, then a straight edge reaching from one to another will show the defects in the wall, which must be corrected by the workman. All this labor and material must be charged up in estimating independent of the regular measurement per yard. This, of course, only relates to old walls. Pugging is the term employed to denote the method of lining in the spaces between floor joists, which is usually done with coarse stuff, and is intended to prevent the passage of sound from one story to another. This is also termed "deafening with mortar." This may be charged by the yard or by the lump; if by the yard, which is the proper way, it is worth from 3 to 5 cents per yard, the lower price for the lower stories, and the larger price for the upper stories. Mortar laid on roof boards under shingles, one half inch in thickness, is worth from 1½ to 2 cents per yard, according to ths quality of the mortar, and the height of the roof. This price, of course, includes labor and all materials.

The Board of Examiners appointed in connection with the new plumbing by-law of Halifax, printed in this number, consists of the City Engineer (chairman), City Plumbing Inspector, and one representative from the Master Plumbers' Association and the Journeyman Plumbers' Union.

Screws used in soft wood are sometimes driven in with a hammer and given a turn or two with a screw-driver to bring them flush. A manufacturer has brought out a new screw which is adapted for driving, and which enters the wood without tearing the grain, as the ordinary screw does. The gimlet point is dispensed with and a cone point substituted. The thread has a pitch that it drives in barb fashion, offering no resistance on entering, but firmly resisting all attempts to withdraw it except by turning it with a screw-driver.

When inserted at the bottom of air shafts, gas jets establish active air currents which withdraw the vitiated air, and may be made especially useful on occasion when apartments are unusually crowded. It has been proved by experiment that 1 cubic foot of illuminating gas can be utilized so as to cause the discharge of 1,000 cubic feet of air; and as a common gas burner will consume 3 feet of gas per hour, it would extract from an apartment 3,000 cubic feet of contaminated air during that period, By suitable contrivances also, the gas lights which are usually such active causes of deterioration, may not only become self ventilating and carry off their own impurities, but also aid materially in keeping pure the air of inhabited apartments.

REASONS IN FAVOUR OF THE AWARDING OF CONTRACTS ON THE SCHEDULE PRINCIPLE.

By W. Fraser.

This system does not interfere with the letting of all departments to one individual or firm, nor with the letting of the several departments to separate contractors. It serves its purpose in either case.

In the primitive mode of tendering and accepting tenders the plans and specifications are the only two written witnesses to the contract. If a case of litigation occurs it generally becomes very complicated, and seldom will either judge or jury decide without an expensive and lengthy arbitration.

Mr. M. J. Barr,
President Vancouver, B.C., Master Plumbers' Association.

The schedule of quantities becomes a third witness to the contract and the most powerful of the three. Indeed it being so demonstrative, it has the effect of deterring men from entering into litigation. The chief object in the business of quantity surveying is the drawing of such an instrument as will produce such favourable results. The system commends itself to business men in the same manner as does receiving of a consignment of goods conforming to an itemized invoice instead of the advice of the cost by simply a knowledge of the lump sum.

There are three parties connected with the building contract, viz., the owner, the architect and the contractor. The architect employs the quantity surveyor for the owner and he becomes their assistant. Of the three parties interested in the contract, it must be allowed that the interest of the owner is the most deserving of protection because he is the money spirit of the enterprise, and this principle does protect him in many ways; particularly it insures him against having to pay for more value than he actually receives, and that at itemized prices established previous to his entering the contract. To detail the amount of assistance given the architect would be lengthy, but in particular the schedule gives him the knowledge (which is his right to have) of the expense of the different component parts of the building which he has designed. It enables him with little trouble to accurately ascertain the progress values of a contract from time to time as the work proceeds. It also relieves him of much unpleasantness in adjusting accounts, which business, in duty to his client, sometimes becomes very disagreeable. It commends itself especially to the junior architect, because it provides him with a school of experience in a short period of time, that following the primitive mode, takes half a life time to acquire.

It may be said that the schedule principle operates more in favor of the owner than in that of the contractor, but it commends itself forcibly to the straightforward man, because it protects his just rights throughout the progress of the contract. It saves his time and fatigue of mind in tendering, and removes any doubts he may have in getting his prices down to the lowest basis. Also it inspires a feeling of confidence in the parties all round, hence gives rise to the production of a better class of work.

There are two classes of contractors who look rather askance at the schedule system. The first is the man of the old school. He clings to the non-exposure of his prices pro rata with a tenacity sufficient to render his motives questionable. It would seem that in the course of his experience in business he had run up against some man whom he thought had done him an injustice at settlement, and therefore he is desirous to keep himself in future prepared for a like emergency, forgetting that in such a case the schedule is his stubborn friend. The other man is the extras grabber, the man who intentionally tenders at under value, in the first instance, with a view to exercising his policy during the progress of the work. Of course he has no use for the schedule, and he has good reasons, because it shuts out his policy.

The practice of this system in England for so many years is the strongest proof of its utility and its sound principle in the matter of fair dealing. Not only has it been practiced in the large cities, but it has gradually branched out into the provincial towns and still continues to enlarge its sphere.

The man who taught the writer the general and vital principles of the business of quantity surveyor branched out from the city of Glasgow to a small town in the north of Scotland, in which there were four architects. Of these four only one readily adopted the system in its entirety. This architect was the junior both in years and business. His career, well known to the writer, gives an example of success. He was a man who saw his opportunities, employed all the assistance (quantity surveyor, engineer, clerk of works, etc.) necessary to enable him to prosecute his profession while he

Mr. M. S. Rose,
Secretary Vancouver, B.C., Master Plumbers' Association.

severely maintained his prestige. The result was that not only did his local patronage increase rapidly, but his high qualifications displayed themselves, and he was found sturdily contesting for precedence with the names of Street, Scott and Burgess in circumstances known to the readers of the "Builder" or "Building News" of the period.

It may be said that the schedule system, except by engineers, is not practised in Canada nor in the United States. The answer is plain. There was a time when it was not practised in England, and it may be that there is a slight prejudice against English methods of business, no matter how much they may commend themselves in the matter of fair dealing. An opposing reason is sometimes given that the system leads into complications. This may happen when blank schedules without quantities are priced by contractors and measurements made from the building after work has been executed. This method should not be followed. It is not followed in England, except in cases of urgency to save time. All measurements should be made from the plans. Quantities should be prepared therefrom unless in case of additional work or deductions, and then the original schedule if properly drawn will clear away all complications.

It can be noticed that a desire manifests itself at times on the part of contractors of certain departments to introduce a schedule or third witness to the bargain. Plans and specification may be shown them by the architect and a desire expressed for their tender to conform to the same. But in return it will be found along with their tender they also furnish a schedule prepared by themselves, and sometimes also drawings or sketches showing their interpretation of the specification and plans. This is not quite as it should be. The architect loses his prestige, and in a court of law the contractor's instrument would doubtless operate against him. The architect should issue his proposals under his own authority and thereby retain his prestige in the works he carries out.

There remains the primitive desire on the part of the owners to overburden architects with multifarious duties which belong to contractors and some to their foremen, and the owners should be educated on this point. In this age of specialities and business rush, when design is becoming important and contracts extensive, the architect ought to pursue that policy which will reduce his own personal fatigue, and thereby be the better able to produce the best results in the interest of his client and in the advancement of his name in his honourable profession.

THE SLAKING AND STORAGE OF LIME AND CEMENT.

We have recently read, says the British Clayworker, a long and very important memoir by Monsieur H. Le Chatelier, whose name is well known as an authority on pyrometry. This memoir details the results of numerous experiments which Le Chatelier has made regarding the slaking and storing of lime and cement. We give the following condensation in which will be found the main results which have been obtained. The rate of slaking in lime varies with the compactness of the product, the porous lime obtained by the calcination of calcium carbonate at a comparatively low temperature (900° C.), becoming at once completely hydrated when brought into contact with some water, whilst the more compact form, prepared by decomposing a fusible lime salt, e.g., the nitrate, requires from 24 to 48 hours. The presence of fusible substances, e.g., silicates, aluminates, etc., retards the operation; as does also magnesia, but this influence is counteracted by increasing the temperature of the water employed for hydration, or by the admixture therewith of about two per cent. of calcium chloride.

In the case of hydraulic lime, the proportion of free lime should be reduced to a minimum, since when hydrated it contributes nothing to the hardening of the mass, and when unslaked tends to reduce the setting power. In practice, the former evil is obviated by a proper selection of the materials—limestone and fuel—and the latter by slaking at a high temperature, i.e., arranging the heap so as to preserve the heat evolved during hydration. In the laboratory, hydraulic lime is best slaked by immersing the vessel in a boiling saturated solution of calcium chloride.

The process of slaking is divisible into four stages in practice, the first being one of simple absorption of water. The mixture being then shovelled up against the face of the main heap, is warmed in contact, and also evolves heat by the chemical action going on; thus a portion of the added water is evaporated. In the third stage the mass cools, and moisture is fixed by the silicates, although some of the free lime still remains unslaked. That this is so may be proved by quickly heating a sample to 150° C. in a tube, whereupon moisture will be deposited at the upper end, though the temperature is too low to eliminate water from calcium hydrate.

In the final stage the unslaked lime removes this water from the silicates, and becomes completely hydrated without any access of external moisture. The operation is simple, the interstitial atmosphere of the heap containing aqueous vapor at a tension equal to that of the dissociation of the hydrated silicates present; the lime continually absorbs this moisture, which is replaced by a fresh quantity released by the silicates, the speed of the operation varying directly with the temperature.

These necessary stages are frequently curtailed in practice to the detriment of the product, a sufficient time being essential to enable hydraulic lime of good composition to slack properly, whilst that which becomes quickly and thoroughly hydrated is sure to be of poor quality.

To enable cement to attain the requisite degree of hydration of the free lime, storage—preferably in silos—is indispensable. The changes it then undergoes correspond to the fourth stage in the slacking of hydraulic lime, thought they are accomplished more gradual by reason of the lower temperature prevailing. The absorption of moisture from the atmosphere being precluded, the addition of a sufficiency of water is necessary to produce the maximum benefit from the process.

The successive crushings employed in grinding hydraulic cement, result in the pulverising of the more completely hydrated portions first, and thereby give rise to difference in the quality of the product. This defect is avoided by a certain addition of water previous to crushing.

By maintaining the stored cement at higher than the ordinary temperatures, say 100° C., the time of storage could be reduced to about 14 days. Such a course would facilitate the manufacture of natural cements—free from aluminates, and therefore less fusible and more easy to kiln. Such cements, although in the absence of aluminates the combination of silica and lime does not ensue, may, when devoid of free lime, have greater powers of resistance than Portland cement. Consequently, proper storage, by tending to eliminate this element of weakness, affords a means of reviving the said industry.

The presence or absence of free lime may be determined as follows:—The sample is made up into a strong paste with water, and left to set, being moistened to prevent dessication. Then, within 24 hours, the block is placed in water and heated to boiling point in less than four hours, the distension produced being measured by the aid of a divided mould or other suitable means.

MANUFACTURES AND MATERIALS

GREEK MARBLE.

As the ancient marble quarries of Pentelicon, in Greece, are about to be developed on a large scale with the aid of modern appliances by an English company, it will not be out of place to mention that these famous sources of the material employed in the finest art and architecture that the world ever witnessed, after remaining undisturbed for a period of over 1,500 years, were drawn upon to some extent during the present century in the construction of modern Athens.

WOOD MOSAIC.

Mosiac work in a variety of forms is always pleasing when well done. Although its origin is obscure, yet for centuries it has been one of the most favored mediums of decoration. In one of the southern counties of England there is still plied a quaint inlaid wood industry which is a modern example of this art. This inlaid woodwork, known as "tonbridge ware"—a name suggestive of pottery—consists of views, flowers, borders and so forth, in all their natural colors, with minute pieces of variously colored woods, each measuring about a twentieth of an inch square. So accurately are these pieces of wood cut, even at these minute dimensions, and so neatly and closely are they glued together, that they resemble one solid piece of wood with the design painted upon it. Curiously enough it was painted drawings upon white wood that originally suggested and subsequently evolved into the present craft.

The principal woods employed in the art, says the Scientific American, are American birch, mahogany, tustic, walnut—American and Spanish—plum tree, tulip—with its beautiful fruit—red grain, cocus, snake wood, nutmeg, rosewood, mulberry, luburnum, box, peach, acacia, maple and Hungarian ash, with its charming silky lustre and moire grain. In short, no wood is useless for the craft so long as it does not contain too great a quantity of sap, although a remedy is found in the case of one or two necessary woods, such as the holly, which is boiled for several hours, an operation not only removing all the sap, but bleaching the wood considerably as well. There is one color, however, which has always puzzled the artist. Up to the present no tree has been discovered the hue of whose wood is gray, and to supply this deficiency birds' eye maple and Hungarian ash are steeped for several weeks in the indigenous chalybeate waters, which convert the yellowish whiteness of these two woods into a soft steel gray.

When it is proposed to inlay a certain view, border or collocation of flowers in wood, a colored design is first of all prepared upon a piece of paper divided into squares of about the eighth of an inch in measurement. The design prepared, the workman proceeds to set it up in wood. This entails great labor and care, for in addition to being a skilled mechanic some artistic sense is absolutely essential in the judicious selection and composition of the different colored woods to obtain the necessary realistic effect. On all sides of him, within an arm's length, are ranged little piles of thin, narrow slips of wood, each slip measuring about an inch broad and varying from a twentieth to a twelfth of an inch in thickness. The workman begins at the bottom left hand corner of the squared design and takes the first set of squares and works across the drawing in a vertical direction. Suppose, for instance, he has to make a boquet of flowers. He refers to the bouttom left hand corner square of the pattern and finds that it forms part of the ground work of the design; that is to say, no portion of the drawing encroaches upon that square. As the ground work is invariably white, he selects a slip of white wood from one of the little piles and lays it flat down upon his bench. Then he proceeds to the next square above. This occupies a portion of the design—the end of a petal or a leaf. This is green, and he therefore selects a piece of wood of the correct greenish shade and places this piece upon the former slip and proceeds to the next square above, and so on until he has worked his way right across the design, taking each square one by one and superposing their corresponding colored slips of wood, in their order of sequence in a little pile by his side. He then glues and presses these little slips tightly together in a little block, three and a half inches long, one inch wide and two or three inches in thickness, composed of thin little strips of variegated wood. He labels this "number one," and proceeds to set up the second line of squares upon the drawing in a similar manner, which he afterwards glues up and consecutively numbers; and so on until he has so constructed the whole design. If the drawing is a very large one, he may have as many as two hundred of these blocks of glued strips of wood. A thin veneer about the twentieth of an inch thick is now longitudinally cut from block number one. As he has now cut the reverse way of the wood, this veneer consists of a number of little frail sticks, three and a half inches in length and about a twentieth of an inch square, firmly held together by the glue. He lays this upon his bench, cuts a similar veneer from each of the other blocks, and glues them together in the regular order. This block is now subjected to tremendous pressure to drive out all the superfluous glue and to unite the thin, frail pieces of wood together. In this block the artist has obtained an exact and complete facsimile, square for square, of the drawing. When thoroughly dry, veneers are again longitudinally cut from this block, and each veneer is a replica of the pattern. Out of a block three and a half inches in thickness it is possible to obtain as many as thirty veneers.

NOTES.

Mr. F. J. D. Smith, who holds a mortage on the works of the Toronto Pressed Brick & Terra Cotta Co., at Milton, Ont., has applied to the courts to grant him an absolute title.

The Gurney Foundry Co., Limited, of Toronto, have recently published an attractive and interesting illustrated catalogue and price list of Oxford warm air and combination furnaces.

The works of the Toronto Plate Glass & Importing Co., in Toronto, were seriously damaged by fire recently. This is the second time that these works have been partially destroyed by fire. The present loss is partially covered by insurance.

The National Wall Paper Company, of the United States, capitalized at $38,000,000 will be dissolved by unanimous consent of the stockholders. The company was formed in 1892 by the absorption of twenty-four separate companies. Outside competition and the demands of the trade for goods identified with individual manufacturers forced the abandonment of the combination.

Vancouver bricklayers, who were on strike for 56½ cents per hour, have accepted the 50 cents per hour offered by the contractors and returned to work.

VISIT OF THE LONDON BUILDERS TO CLEVELAND.

We are indebted to Mr. Geo. S. Gould, secretary of the London Builders' Exchange, for the following interesting account of the recent visit of the members to Cleveland, as the guests of the Cleveland Exchange. :

Last year the Builder's Exchange of Cleveland held an excursion to Port Stanley. The London Exchange invited them to London for noon-day lunch and a drive through the city, and then returned with them to Port for the balance of the day, where they gave us a splendid afternoon's sport, and a banquet in the evening at the Fraser House. The only amends we could make at that time was to give them a lesson in the art of base ball. They demanded satisfaction, and obtained from us a promise to visit them this year, so on the 24th of July last about 70 of our members with 60 ladies left Port Stanley at 11 p.m. on the steamer Urania for Cleveland, arriving there the next morning at 6 a.m. Their committee met us at the wharf and escorted our party to the Weddell House for breakfast. From there we visited their Exchange rooms in the Chamber of Commerce building, where they occupy the whole of the third floor, and have utilized every inch to the best advantage. For Exchange purposes it would be simply impossible to improve their lay out or furnishing. There need be no delay in reaching their rooms, as they have four elevators, and in a very few seconds you are landed in their corridor; from there you obtain entrance into the main room. This immense floor space is divided into sections, large or small as desired, and rented to manufacturers, who place their wares there as exhibits, and architects and proprietors make a practice of coming there and making their selections for building purposes. Here we have sample brick of all kinds as well as laid up work, terra cotta, beautiful displays of marbles, fancy iron work, builders' hardware, wood mantels, grills, parquet floors, etc., in fact there is almost everything to be found there that is used in the construction and ornamentation of buildings. There are also a number of small spaces rented by the members and fitted up by them as offices where they transact their business during the day. They have also private rooms where plans are figured on, consulting room, a board room, president's private office, secretaries' office, lavatories and telephone room. They keep two secretaries permanently employed, and a page boy in livery. On the ground floor of the building is a large auditorium where they hold their banquets. After we had inspected the rooms and registered they placed us on cars for a trip to one of their parks about 9 miles east. On our return to the rooms again we were tendered a formal reception and luncheon by the Exchange. At 1 p.m. we all took cars again for Scenic Park, where a programme of sports was participated in by the members of the two Exchanges. We would like to forget all about the baseball match, but—well, they had their revenge. The tug of war heavy team they won. The tug of war light team we won, and the rest of the honors were about evenly divided.

The Cleveland Builders' Exchange Committee consisted of Arthur Bradley, W. J. Warden, W. B. Green, C. C. Duschel, W. H. Gick.

The London Exchange Committee was composed of: Samuel Stevely, chairman; Thos. Jones, secretary; Ed. Martyn, John Hutkins, H. Stratfold, Wm. Smith, Geo. Everett and the President.

On returning to the city we were taken to the Hotel Stilson, where a sumptuous banquet had been prepared. About 300 sat down at the well filled tables. Between the courses several patriotic and other songs were ably rendered by Ruthven McDonald, of London. After ample justice had been done to the viands the acting president of the Cleveland Exchange who was in the chair, in introducing an appropriate toast list, gave expression to the great pleasure afforded their Exchange in meeting so many of the London members and their ladies in Cleveland.

When the London Builders' Exchange was toasted, Mr. Samuel Stevely, chairman of the general committee, called Mr. Arthur Bradley, past-president of the Cleveland Exchange, and Mr. Wm. Tytler, president of the London Exchange, to the front, and in an appropriate speech presented them each with a handsome gold medal, the gift of ex-mayor J. D. Wilson. of London, (who was unavoidably detained from being present) given as souvenirs of the very pleasant reunions held in Canada last year and in Cleveland this year. The recipients feelingly responded. After the postmaster of Cleveland had responded to the toast of the ladies in a glowing tribute to their worth, we had to retire in haste as the boat was waiting. So terminated one of the pleasantest days' outing we have ever enjoyed. Accompanying our party as the guests of the Cleveland Exchange were the Mayor and Col. Culver, the U. S. consul of this city, and Ald. McCulloch, of St. Thomas.

NEW PLUMBING REGULATIONS OF HALIFAX, N. S.

The City Health Board of Halifax, Nova Scotia, have recently revised and amended in many important particulars the regulations governing plumbing work in that city. These amendments, which are now before the govenor-in-council for approval before coming law, are as follows :

Sections 33 to 52 both inclusive of the rules of the city board of health hereby amended, as also the rules previously amending the said sections, are hereby repealed and the following substituted therefor :

33. A board of plumbing examiners is hereby constituted, to consist of the City Engineer and the city inspector of plumbing. The board shall be called together by the City Engineer (who shall be chairman of the board) at such times as the board of health may direct.

34. No person shall do or perform any plumbing work as a master plumber in the city of Halifax unless he is duly licensed to perform the same and is registered as such in the office of the board of works for said city, and the person obtaining such liscense shall be known as a "Master Plumber" and shall pay for said license to the Board of Works the sum of ten dollars.

35. To entitle any person to a license under the next preceding section he shall be of the full age of twenty-one years and have a place of business as a plumber in the city of Halifax, and shall furnish to the board of plumbing examiners sufficient evidence that he is himself a practical and expeirenced plumber, and his license as a master plumber when issued shall be kept in a conspicuous place in his place of business.

36. Every person before doing any plumbing work or business in the said city for or on account of himself or any master plumber shall be a practical and expeirenced plumber and furnish the board of plumbing examiners sufficient evidence that he is capable of properly doing and performing plumbing work in said city, and if the said board is satisfied of his competency to perform said work they shall cause his name to be registered in the said office of the board of works and give him a certificate of competency as a journeyman plumber, after which he shall be at liberty to do such plumbing work, but not before.

37. Every person desiring a license as a master plumber or as journeyman plumber shall file a petition in writing with the clerk of works, giving the name of the applicant, and if the applicant is

applying for a master plumber's license he shall state in his petition his age and place of business in said city, and said petition shall be accompanied with the bond hereinafter referred to.

38. Any change in the location of the business of a master plumber shall be promptly reported to the said clerk of works.

39. Any journeyman plumber desiring to become a master plumber shall first comply with these rules and regulations as to master plumbers and no journeyman plumber shall do business as a master plumber until he has obtained a master plumber's license, notwithstanding anything in these rules and regulations.

40. Any master plumber or journeyman plumber who furnishes satisfactory evidence to the board of plumbing examiners that he has carried on the business as a practical and experienced master or journeyman plumber in the city of Halifax for not less than four (4) years next previous to November 29, 1897, shall be entitled to receive a license or registration without examination.

41. All licensed master plumbers shall be held responsible for all acts of their employees for work done in connection with their plumbing business in respect to which such license is granted.

42. Every licensed master plumber shall on the first day of every month report to the City Engineer upon printed forms to be supplied at the City Engineer's office, the number, nature and extent of all new plumbing fixtures placed by him or his journeyman plumber in any building in said city, but they shall not be required to make returns of any old fixtures renewed except water-closets and urinals.

43. Every master plumber shall only employ journeymen plumbers to do said plumbing work, but said work may be done and performed by any any practical plumber under the guidance and direction of a journeyman plumber or master plumber then present directing the work.

44. Every master plumber before obtaining a master plumber's license shall file a bond with the Clerk of Works in the penal sum of two hundred dollars conditioned for the faithful performance of his duty as a master plumber and for his not permitting or allowing any plumbing work that he may be called upon to do to be performed by any person in his employ except by such persons as may be authorized to do plumbing work under these rules and regulations and for his not violating any of the terms and conditions of said rules and regulations or any other rules or regulations in force in the city respecting plumbing, drainage, sanitary matters and the city waterworks.

45. No person shall carry on business in the said city as a master plumber unless he is the holder of a license herein mentioned, nor shall any journeyman plumber do or perform any plumbing work until he has obtained his certificate under these rules and regulations.

46. No person shall be allowed, without having first obtained a permit from the city engineer to open or shut off, the street stop-cock connected with the service supplying any premises or buildings, unless in case of urgent necessity to prevent loss or damage from flooding, and shall in every such case leave the stop cock as he found the same, and any person who shall commit any damage or injury to any stop cock in the service pipes of the department shall be liable for the amount of any such damage in addition to any penalty imposed for the violation of these rules.

47. When any old fixture or plumbing requires renewal the work shall be done in accordance with these rules and regulations as far as they apply, but it shall not be necessary to take out any old work which, in the opinion of the plumbing inspector, is in good sanitary condition. In every case where in the opinion of the city engineer and plumbing inspector the enforcement of any rule or rules respecting plumbing is impracticable or inadvisable they shall have power to modify or suspend any such rule or rules to meet the exigencies of the particular case.

48. The city engineer, the foreman of waterworks, or any inspector appointed for that purpose, shall have the right at proper hours of the day and upon reasonable notice given and request made upon the owners, to enter upon and have free access to all parts of any building in the city of Halifax in which water from the city waterworks is delivered or consumed.

49. The City Health Board shall have the power at any time to cancel any master plumber's license or any journeyman plumber's certificate for cause, and thereupon all rights of said master plumber or journeyman plumber to do any plumbing work under these rules or regulations shall cease and determine.

50. The license to master plumbers shall expire on the 31st day of December in each and every year, but they may be renewed by the City Board of Health on the recommendation of the Board of Plumbing Examiners, and master plumbers shall pay one dollar for each and every renewal.

51. The City Health Board shall from time to time as occasion may require, on the nomination of the city engineer, appoint such inspectors of plumbing as may be found necessary, but no person shall be eligible for such appointment who has not passed a satisfactory examination for proficiency in both practice and theory of plumbing and drainage before the Board of Plumbing Examiners.

52. Such inspector or inspectors shall be under the supervision of the city engineer, and shall be attached to the office of the said city engineer, and shall be paid such salary as the city council determines.

53. All work contemplated in these regulations shall be done by a licensed master plumber or by a certificated journeyman plumber in the employ of such licensed master plumber or as provided in rule 43, and shall be subject to the inspection, supervision and approval of the city engineer or an inspector appointed by the city health board for that purpose, and all faulty or defective work which is at any time discovered shall be made satisfactory to the said engineer or inspector, as the case may be, and when found satisfactory the certificate shall issue to the plumber at the expiration of thirty days from date of inspection, unless in the meantime such work has become faulty or defective.

54. Hereafter no person or member of any company or employee or apprentice of such person or company shall do or perform any work authorized by these rules, nor shall any such person or member of any corporation direct or instruct any employee or apprentice to do or perform any such work until the owner or his agent shall have first obtained the permit and filed the plan and specification mentioned in rules 27 to 31, both inclusive, of the rules hereby amended.

55. Every person violating any of the rules and regulations of the board of health shall be liable to a penalty of not less than five dollars nor more than eighty dollars for each offence on summary conviction before the stipendiary magistrate, and in default of payment to imprisonment in the city prison for a term not to exceed ninety days.

Sec. 1, Sub-section. It is hereby repealed and the following substituted: No trap vent pipe shall be less than three inches in diameter where it passes through the roof, and all vent pipes after leaving the trap must continue to rise above the bottom of any fixtures vented before being connected with or to any other vent, and vent pipes must pass out through the roof or be connected with the soil pipe.

Section 4. The first sentence is struck out and the following substituted: Every connection between lead and cast iron pipe shall be made with brass ferrules properly gasketted, leaded and caulked into the soil pipe, and every connection between lead and wrough iron pipe shall be made with brass soldering nipples having properly wiped joints.

SOME MISTAKES OF CONTRACTORS.

Contractors often make mistakes in assuming responsibilities without proper compensation and in taking unnecessary risks, says F. E. Kidder, the well-known consulting architect, in a late issue of the Brickbuilder. Not a few contractors will estimate on a hazardous piece of work on the basis that everything will proceed favorably, and if any mishap occurs they have no provisions for meeting the expense invariably occasioned. The contracting business necessarily involves the taking of some chances, as in the rise in price of materials or labor, but when unusual chances are to be taken, as in remodeling, underpinning, or supporting old buildings, or in the case of uncertain foundations, the contractor should protect himself by estimating so that in case unexpected, although possible, difficulties are encountered he will not lose more than his profit. It is much better to let some one else have the job than to take it at a figure which will allow a profiit only under the most favorable conditions.

Then many contractors are careless about allowing their work to be damaged by other workmen or through orders of the owner or architect. For instance, a

mason contractor has built a cellar or basement wall, and the excavator wishes to fill against it on the outside before there is sufficient weight on the wall to insure its stability, or perhaps he may be directed to do so by the architect or owner. If the excavating is under the control of the mason, he can forbid the filling until such time as it may be done with safety, but if he has no control over it, he should protect himself by notifying the owner in writing that if the filling is done it must be at his, the owner's risk, otherwise if the wall springs or falls the mason contractor will be expected to make it good.

Similar risks or chances of injury frequently arise in connection with other portions of the building, especially when the work is done under several contracts, and the wise contractor will protect himself as far as possible from damage that may happen to his work through the ignorance or carelessness of others. If a contractor executes a given piece of work in conformity with the plans and specifications, and it is injured through the fault of persons working under another contract with the owner, it is evident that the first contractor should not be made to suffer from the damage; but it is the experience of all who have had charge of building operations that, unless some unusual precautions are taken, it is difficult for the contractor to collect damages for repairing his work, and he must leave it in good condition before it will be accepted.

Contractors also occasionally run a risk in attempting to execute work that is not properly designed or has not sufficient strength. For example a stone lintel may be shown on the drawings with a span so great that it is doubtful if the stone will support its own weight and that of the load upon it. Now, if the contractor goes ahead and puts in the lintel without comment, and it breaks, the chances are ten to one that the architect or owner will insist on his putting in another stone or remedying the defect in some way, at his, the contractor's, expense. The same thing may happen in the case of an arch without sufficient abutment, or of a flat arch with no support under it. It is therefore the business of the contractor to carefully consider all of the constructive features of the building bnfore he commences work on them, and if he believes that any part of the work cannot be safely executed, as shown by the plans, he should call the attention of the architect to it and try and have it changed, or extra provisions made to give the necessary strength, so that there will be no risk of failure. In case the architect declines to make any change, the contractor should serve a written notice on the owner that he will not be responsible if the work fails, and at the same time he should take care to see that the work is executed in the best manner, and in strict conformity with the plans and specifications, so that in case it does fail there will be no opportunity to show defective work as a cause. Generally it will pay the contractor to go to some extra expense himself to insure the safety of the work rather than to run any risk of a dispute or possible lawsuit. The writer has known a number of instances where contractors have suffered considerable loss from carelessness or negligence in this respect.

Occasionaly a contractor permits himself to be imposed upon by the architect in the way of details. Not a few architects have the fault of showing much more work on their details than is implied by the scale drawings, and of expecting the contractor to carry out whatever they may choose to draw. Of course, if the details are made before the contract is awarded, and the contractors have an opportunity to examine them, it makes no especial difference it the drawings do not exactly correspond, as the details would determine the character of the work to be done, and the tender would, or should, be based on them. When the details are made after the contract is signed, however, the contractor is not obliged to adhere to them if they show more expensive work than is reasonably implied by the scale drawings and specifications. Thus, for illustration, where carving or dentils are put on the detail drawings, but are neither shown in the original scale drawings nor mentioned in the specifications, the contractor may claim an extra price for the extra work, or refuse to execute it. A claim for extra remuneration, however, would probably not be allowed unless made in writing before commencing the work, and acknowledged by the architect. It is, therefore, best, in such cases, for the contractor to politely call the attention of the architect to the discrepancy and show him that the work cannot be done for the price which the original work was figured. If he is then unwilling to either allow an extra price for the work, or to change the details, the contractor must choose between omitting the extra work or putting it in at his own expense. If to carry out the details means a loss on the contract, it will probably be best to refuse to do more than the contract drawings call for, but if only a small amount is involved, it may pay the contractor to retain the good will of the architect by doing the work. Very often such extra work is put on the detail drawing by draftsmen without the knowledge of the architect, and when his attention is respectfully called to it he will have the details revised.

In conclusion, the writer suggests that while the main object of a contractor is to make a profit from his business, or, in other words, to make a success of it, such success depends upon the exercise of a considerable degree of intelligence and tact, and that a successful contractor must have in mind the interests of the owner and architect as well as of his own; also that a successful business does not necessarily imply that a profit must be made from every piece of work. Not a few successful contractors owe their success in a considerable degree to the fact that they have carried out their unprofitable contracts with the same thouroughness with which they have executed their profitable ones.

Mr. John M. Burnett, contractor, of London, Ont., was severely injured by falling from the upper story of the new Masonic Temple now in course of erection in that city.

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AGENTS FOR CANADA

NORMAL BUILDING SAND.

An important feature in connection with the use of mortars and cements in masonry structures is the nature of the sand used in the mixture; yet in nearly all tests the cement is the main object under consideration, the sand being often rather neglected. It is this fact which gives especial interest and value to the tests, of so-called normal sands selected from various countries, recently conducted by Herr M. Gary at the Berlin Testing Laboratory. From the Mitt. aus den Kgl. Technischen Versuchsanstalten, in which the full report appeared, the following abstract of the work is given. It is well that attention has been directed to so fundamental an element in building construction.

Ten different varieties of sand were tested, and in order that there might be no doubt as to the high quality and character of the samples, care was taken to have them selected by experts of acknowledged reputation in the various countries from which they were obtained.

Two varieties from Germany were treated, one being a crushed quartz from Freienwalde in Prussia, and the other the sand obtained from the Rhine by dredging. Single samples of standard sand were obtained from Austria, Switzerland, Russia, Norway, England, and the United States, and two samples from France, one of these being from Leucate, a natural sand brought down by the mountain streams of the Pyrenees, and the other a crushed quartz from Cherbourg.

The tests of the ten varieties of sand consisted in a chemical analysis, and a measurement of the loss of weight at red heat, as well as a determination of specific gravity, and size of grains, after which briquettes were made with Portland cement and subjected to tension tests after seven, twenty-eight, and ninety days hardening under water. Two sets of briquettes were made with each kind of sand, one set containing one part by weight of cement to three of sand, and the other one part of cement to five of sand. The former proportion represents the usual practise in nearly all countries; the latter was used to the extent to which the addition of a greater proportion of sand affects the strength. Very interesting microphotographs were made of the samples of sand, and the difference in the character of the grains were in some cases very marked.

It is impossible to go into the details of these interesting tests which are fully tabulated and illustrated with diagrams in the original report, but some of the conclusions are here given.

Among other points it was found that the very sharp crushed quartz sand, which under the microscope showed an angular structure, gave a high tension test and a low compression test, while the natural sand, with rather rounded grains gave proportinately better results in compression, Thus for the American sand, a crushed quartz from Masachusetts, the ratio between the tension and compression tests was 1:2.7, while for the English sand, which, under the microscope showed round smooth grains, the ratio was 1:10.

The resistance to tension for the mixture of three of sand to one of cement was, for the English and American sands, respectively 424 pounds and 451 pounds per square inch, while for compression the figures were 4,300 pounds and 2,660 pounds. The American sand stood among the highest in the tension tests, being equalled only by that from Switzerland, but in the compression tests it was much lower than any other, the next higher being 3,500 pounds per square inch. On the other hand the only sand which equalled the English sample in compression was that dredged from the Rhine, which also showed a similar rounded constitution. This feature is one which is worthy of further investigation, as, if it is possible to obtain high tension tests for a cement by the use of a sharp sand, while at the same time its resistance, while applied in practice with similar sand under compression, is diminished, these facts should be taken into consideration, or else, more properly, both tension and compression tests should be required.

Tests made with mixtures of sands of coarse and fine grains showed inferior results to those obtained with sands uniform in size of grain.

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QUESTIONS AND ANSWERS.

J. M., a Montreal, subscriber, writes: Referring to a recent article in the Builder's department of your journal, please explain to me more fully the brace measure, which I do not rightly understand.

ANSWER.—The brace rule figured off on the steel square is so arranged that the third set of figures indicate the length of the brace from point to point, required to reach diagonally the two points indicated by the two first set of figures. Thus, $\frac{27}{27}$ in the example given would require a line 38, 19 to reach diagonally the joints named, the angle being a right angle. Now, if we make the figures represent inches; then, we run 27 inches along the gist of a piece of framing, and 27 inches down the post, and the brace required to reach the two joints must be 38 inches and 19 hundredths of an inch in length. Nineteen hundredths of an inch is a trifle less than 1/5 of an inch, which is near enough in timber framing. The exact nineteen hundredths can be taken from the diagonal scale, which is engraved on all good squares. In Hodgson's book, "The Steel Square and Its Uses," this question of scales is exhaustively discussed and made quite clear.

It is said that the addition of even so small a proportion as one-tenth of as much brick dust as of sand to ordinary mortars is preventive of the disintegration so often characterizing mortars used in the masonry of public works. The use of such dust mixed with lime and sand is said to be generally and successfully practised in the Spanish dominions, and is stated to be, in all essential points, superior to some of the best imported hydraulic cements for the construction of culverts, drains, tanks or cisterns, and even for roofs, whether for setting flat tiles or for making the usual flat tropical roof.

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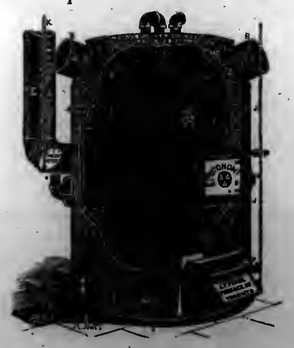

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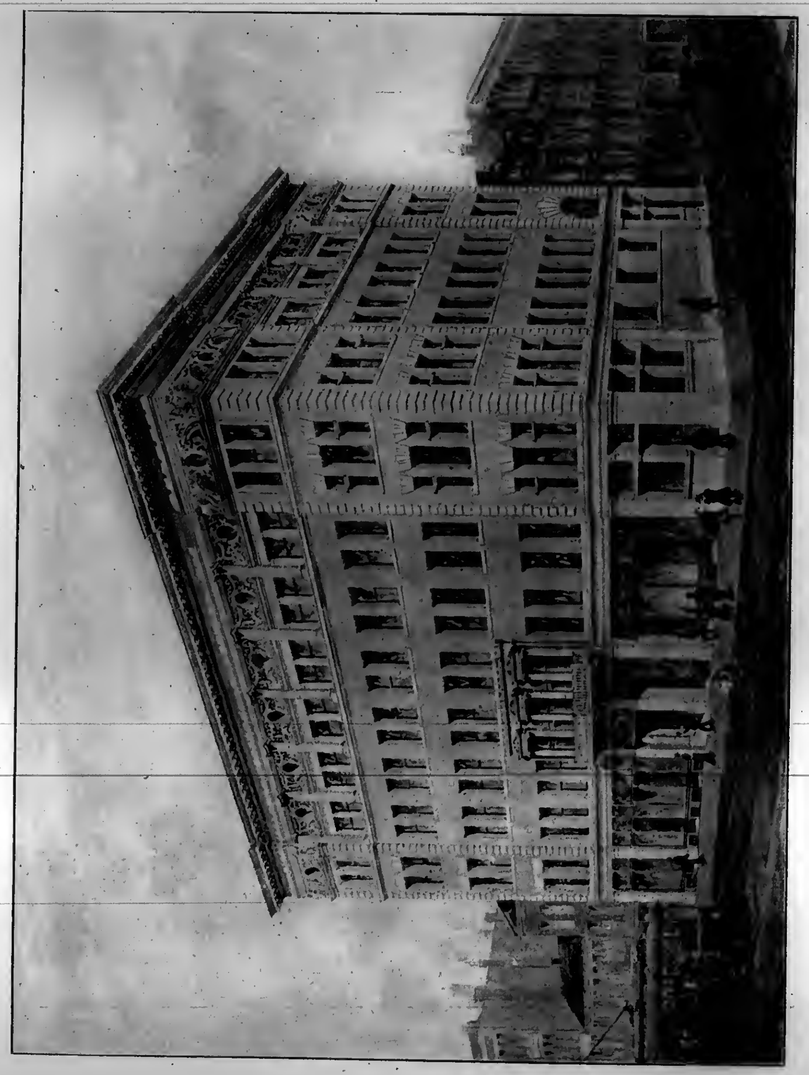

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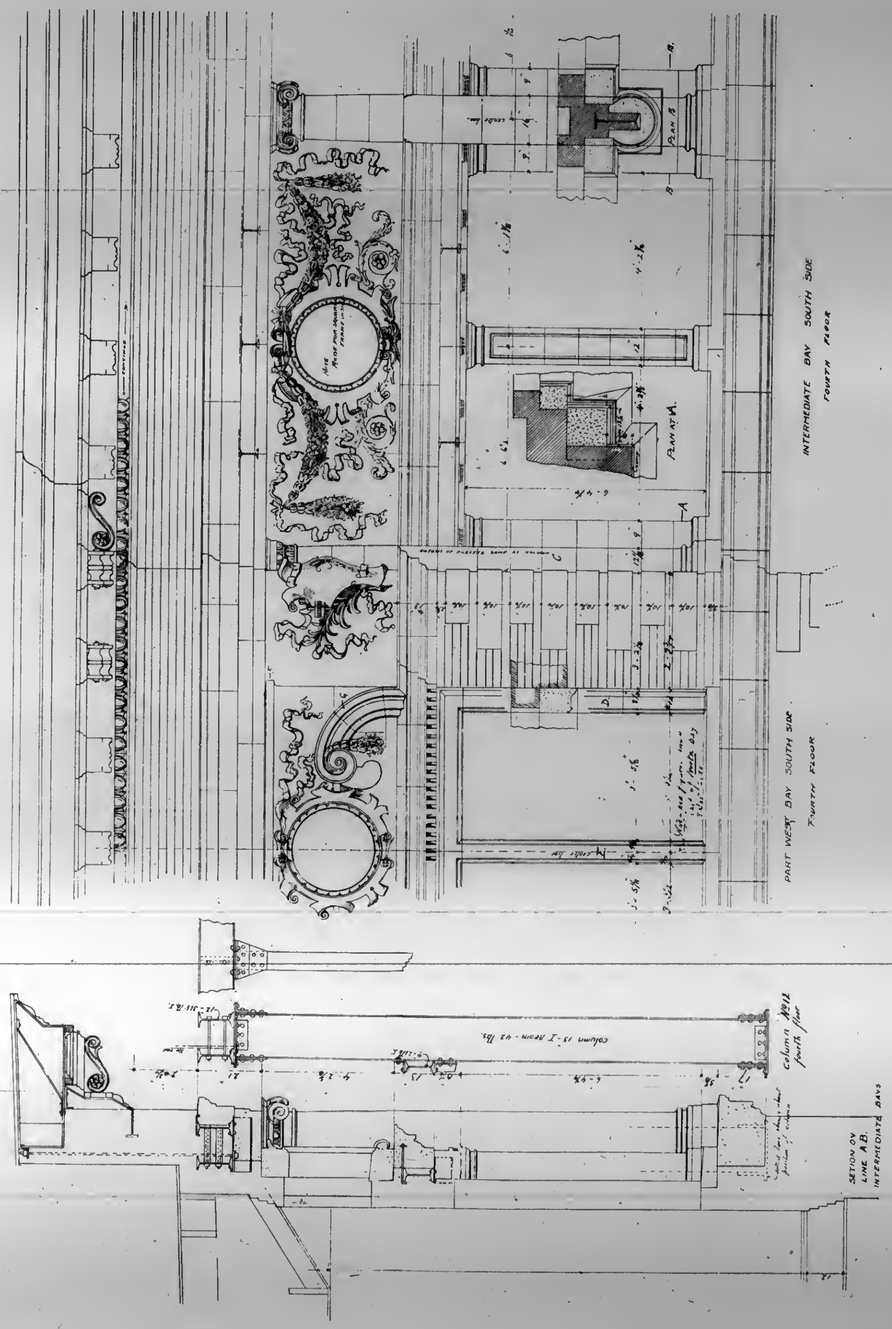

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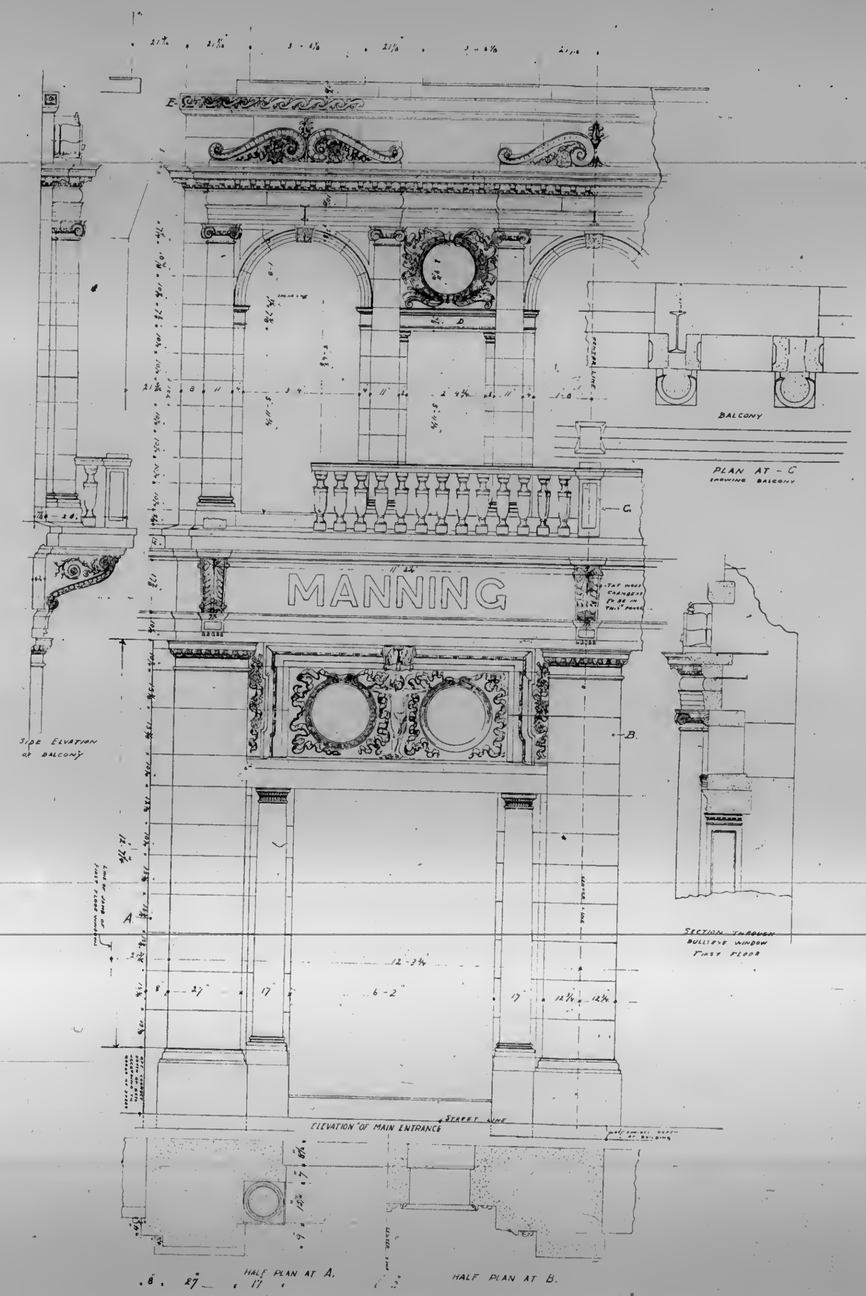
THIS PAGE RESERVED EVERY MONTH FOR WORK DONE BY MEMBERS OF THE ARCHITECTS' EIGHTEEN CLUB, TORONTO.

DOOR IN THE PALAZZO VECCHIO, FLORENCE.

(ILLUSTRATING ARTICLE IN THIS NUMBER, BY MR. W. A. LANGTON, ON. "SHEET-METAL AS SHEATHING").



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VOL. XIII.—No. 9. SEPTEMBER, 1900 PRICE 20 CENTS $2.00 PER YEAR.

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The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to foreign subscribers is $2.50. Subscriptions are payable in advance. The Journal will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrears of subscription paid.

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A Result of the Ottawa Fire.

NOTWITHSTANDING the adoption by the City Council of Ottawa of new building regulations calculated to prevent destruction by fire, the insurance authorities are reported to have decided to increase rates in that city by 25 to 50 per cent. This action should be sufficient to compel the extensive use of fire-resisting materials and the erection of a greatly improved class of buildings.

The A.I.A.

IT has been decided to hold the annual convention of the American Institute of Architects at Washington, in December, during the session of Congress, in the hope that the meeting may exert an influence in furtherance of several public improvements of a national character, which are expected to come up for consideration at that time. These include the remodelling of the White House, the proper grouping of the Federal buildings, plans for the improvement of the city, etc.

Quality in Portland Cement.

THE manufacture of Portland cement is attended with many difficulties, hence the product of different manufactories is likely to vary widely in quality, and purchasers require to be cautious in buying. The process of manufacture in Canada, by the older established factories at least, has to a large extent been perfected, and the products of these factories is of a uniformly high character. There are a number of new factories projected, which, though able to profit by the experience of their predecessors, must to a certain extent contend with the difficulties incident to the experimental stage of manufacture. The owners of these factories, in order to secure for their products a place in the market,

should be prepared to furnish buyers with detailed results of carefully conducted scientific tests showing the quality of their material.

The Latest Phase of Unionism.

THE local labor union, of Vancouver, B. C., are reported to have absolutely prohibited their members from joining or remaining in the militia. In doing this, says the American Architect, the unions have taken a step which brings them perilously near to giving notice that they enrol themselves in the ranks of anarchists, pure and simple, enemies of society as established, and as such to be pursued and punished to the bitterest extremity upon the performance of the first overt act against the laws of order. The militia is one of the recognized arms of government, and any citizen who evades duty in its ranks, is unworthy of the protection which under other circumstances, the law would afford him, and for all we can see, is subject to attainder for treason the first time he resists the law. Any body of men who give public notice that they feel themselves obliged to obey the rules that contravene the laws established, by and under the constitution, by the people, place themselves voluntarily in the position of public enemies, and must abide the consequences.

Strength of Brickwork.

THE failures of brickwork which occasionally occur in Canada, are probably in some measure due to the application by architects of the standards of strength published in Trautwine's and and other American hand books. The tests of Canadian bricks which have been made at the School of Practical Science, Toronto, show that the native material should not be loaded much above five tons to the square foot. The following quotation from Trautwine shows that his standard is nearly double that amount. He says: With our present imperfect knowledge on the subject, it cannot be considered safe to expose first-class pressed brickwork in cement, to more than 12 or 15 tons per square foot; or good hand moulders to more than two-thirds as much." Local tests have also shown quite a difference in strength as between bricks manufactured at Hamilton and at Toronto. So that it becomes necessary that the architect should ascertain for himself, as nearly as possible, the strength of the actual material which he proposes to employ, Some years ago a series of valuable tests of Canadian building stones was conducted under the direction of the Ontario Association of Architects at the School of Practical Science, Toronto. At a later date some tests were also made by the school authorities, of brick piers. It is desirable that the latter tests should be supplemented, so that Canadian architects, engineers and builders, might have all the data required to guide them in the use of the native material.

Technical Education.

A REPRESENTATIVE of the Bureau of Labor of the United States is said to be in Canada for the purpose of making enquiry into the subject of technical education. The results are likely to be disappointing and of little value. The haziest ideas seem to prevail here with regard to the subject. Nobody has apparently any well founded knowledge of the lines on which a technical school should be conducted, or of the character of the instruction which such an institution should impart. This statement applies also to the Board of Management of the Toronto Technical school. The large falling off in attendance of late is an evidence that the institution is not being conducted on proper lines, and that it is not fulfilling the purpose for which it was established. Under present circumstances the large expenditure for maintenance seems to be an unprofitable one. Nor does it seem wise to expend nearly one hundred thousand dollars in a building before the lines on which the school should be conducted and could be made successful have been determined. It would be as wise to attempt to construct a building from the roof downwards. A few more years of such management as the school is now subjected to will result in irretrievable ruin. The cause of the trouble seems to lie in the fact that the Toronto Trades and Labor Council has been given a controlling influence on the Board of Management. Why should this be the case? The Council have no more interest in the success of the institution than the representatives of other interests. Nor on the whole are its members as well qualified by education and travel to judge of the requirements. It is time to call a halt, reconstruct the Board of Management, and decide what are the functions of a technical school, what kind of instruction is demanded by its prospective students and the best means by which it may be given.

Province of Quebec Association of Architects.

THE annual convention of the P.Q.A.A., the proceedings of which are printed in this number, was characterized by a small attendance and an apparent lack of interest on the part of a majority of the members. This was perhaps, in a measure, due to the meagreness of the programme. There were no papers, and apparently no subjects set down for discussion. The Association dinner which was formerly an adjunct of each convention, was omitted also. Under these circumstances, it was perhaps too much to expect a large turnout of the members. Meetings of this kind, to be successful, must have a carefully planned programme, calculated to interest and profit the members. As our Montreal correspondent suggests, there should be papers on subjects of interest to the profession, the discussion of which should, to a certain extent, be pre-arranged. Printed copies of the papers should also be sent out to members in advance of the meeting, and they should be invited to come prepared to take part in the discussions. Our correspondent suggests other causes for lack of interest on the part of the members in the affairs of the Association, regarding which we have no knowledge. The report of the Council shows that the new Association rooms which were fitted up at considerable cost, are not made use use of by the members, therefore the proposed large expenditure on an architectural library to be placed in these rooms, would seem likely, under existing circumstances, to be an unprofitable investment. The new Council would do well to try to discover the cause of the apparent apathy on the part of a majority of the members, and if possible provide a ramedy. We are heartily in accord with the views expressed by Professor Capper, the retiring president, regarding the necessity for better theoretical and aesthetic training of the students. In the proper education of the students lies the hope of a higher standard of architecture and architectural practice in Canada in the future, as well as the existence and usefulness of the Association. The Ontario Association of Architects having come to realize this fact, are about to formulate and put in operation an educational system for the benefit of students. Every young man who desires to enter as a student the office of a member of the Association in the future will be required to bind himself to take the required course of study and pass the prescribed examinations. Might not the Associations of Ontario and Quebec with advantage work together in this matter?

A SUMMER HOUSE ON THE LAKES.

The summer house on an island or point in one of the back lakes is an institution so well established that it has ceased to be satisfactory in the crude simplicity that distinguished the first experiments. People do not now play at temporary barbarism as they used to. There is as good boiled linen to be seen at the evening meal in a well-kept house on the lakes as there is in town. People have discovered that all the joys of an out-of-doors life are possible without dispensing with the niceties of ordinary refinement, and yet the houses in which the summer is passed are such as in many ways to contradict this tendency and to interfere a great deal with the comfort of a household composed of ladies and gentlemen who, however great friends they may be, do not want to be in constant sound of one another night and day, and hardly able to avoid keeping track of one another's private movements.

With tight joists, wide apart; ⅞" flooring and partitions of matched boards, a bedroom ceases to be a private apartment. It is merely a cubicle with enough protection to fend off sight, but with none against sound; and to take precautions against being heard merely adds the indignity of stealth.

The question of expense, of course, is concerned in that of the simplicity of the building; but, in the first place, the time has come to spend a little more money—it need not be much more—upon these houses; and, secondly, there is a great deal to be done by mere attention to plan, without involving greater expense.

The life is so much an out-of-doors life that the location of the house must be part of the plan, not only for the ordinary conditions of relation to the sun and to the view, but because certain functions that are usually performed inside the house will now be performed outside of it. The bathrooms are out of doors. They cost nothing in themselves, and there is no question of expense connected with their being made comfortable. But there is plenty of room for planning with the condition that the bathing places and the house shall be considered as one piece, and arranged so that the approach to the gentlemen's bathing place may be from the gentlemen's rooms, and that to the ladies' bathing place from the ladies' rooms, so that there may be no danger of rencontre between pyjamas and dressing gowns on the way to the morning bath. Pyjamas are a perfectly respectable attire. Traders in the South Sea Islands transact their business thus habited, and if some member of the more dressy professions would start the same fashion for July and August "in this Canada of ours" he would deserve well of his countrymen. Dressing gowns also, when caught in at the waist and adorned with a Watteau pleat, are nothing more than tea gowns more highly flowered and surmounted by hair differently piled up from the method that obtains later in the day. The final cause of the large horse-cloth check that makes pyjamas splendid, and also of of the greater though more imperfectly apprehended elegance of dressing gowns is no doubt the chance of their being seen; but such chances ought to be limited to fires, fits, burglaries, and other nocturnal catastrophes. In their essence they are symbols of retirement, and to rashly expose them to the light of day and the sight of eyes is to withdraw the veil that makes the sanctuary. Modesty may be unassailed, but reverence is tampered with; and it is time that the principles of house planning were applied to the summer house and its surroundings so that outside the house as well as within it there should be a men's quarter and a women's quarter, in approaching which either sex may have no need to dodge the other.

Within the house as well as without this would be the system of greatest convenience, and overcome most effectually the disadvantages proceeding from the necessary flimsiness of construction in a cheap house. Men's quarters over the boat house is a satisfactory arrangement, but it tends to make the boat house taboo to the women except at certain times. Separate wings for the bed rooms, each giving towards its own quarter, is the obvious solution of a house which is spacious without being substantial. All elaboration may be concentrated in a central living hall with a fireplace. In proportion as a building is compact, it must be more substantial in order to be more comfortable. A double floor with felting between would do much to do away with the noisiness and want of privacy in a small house; and something should also be done to the partitions. This is the burlap period of architecture and and burlap could be of great service in killing the resonance of wood.

In placing a summer house the paramount consideration will be the view, but the question of aspect has its usual importance, and as usual there are considerations of both cold and heat; for the inevitable cold wave that comes at intervals in the summer, and is so welcome in town, affects the idle dwellers in a summer house as it does the idle fly. They come out after breakfast to crouch in the sun and thaw their numbed faculties; and it is essential that they should have a sunny front as well as plenty of shade. Indeed the sunniest aspects should have the largest exposure of the house, because it is from that quarter that the breezes of the hot days come, the only breezes that we cannot do without. There is not much danger of darkening the hall too much by wide verandahs, for its wall surface should be mostly doors and windows, and in any case, where people are so much out in the sun and air, a house is chiefly welcome as a cool dive, free from glare. What house life there is in the day time goes on chiefly on the verandah, and it must be not only wide but many sided so as to give not only shade at all times but shelter from all breezes. This puts the kitchen side and the bedroom approaches obviously to the north. There is no sun there, and the breeze from that side is rare, and not welcome when it comes. The three remaining sides are all pleasing aspects at some time of the day or in some kind of weather, and in choosing a site they should have recognition as the best aspects for the front part of the house.

The greater part of the problem of planning a summer resort is site, and if the architect, when there is an architect, could only get in at the point of choosing site, he might achieve perfection. A good site for a house is apt to have a somewhat unpromising appearance from the water. A good deal of rock and a few trees, though not much to look at, make an excellent place to look from. A house that looks from it will have free outlook and will get all the air that is going, while its presence makes the spot to be no longer unadorned. A fine old bluff well above the water is tempting, and of course has advantages when one gets there; but the labour of getting there many times a day kills the advantage. A house must not be too far from the water, with which the occupants want to be in constant touch; and after all, though a

high view is always fine, the most charming view over water is the low view over the surface.

There must be trees at the rear to screen the back premises and to shade the ice house, and a tree or so in front gives composition to the view. The fringe of bushes that is so apt to grow along the edge of the water, makes a natural screen for the bathing places. It is impossible not to regret the growing tendency to fit summer houses with bath rooms. A kitchen sink is both a necessary convenience and is no drawback, for it is easily drained over the surface at a sufficient distance from the house. If necessary it may by a simple contrivance discharge over a different surface for every day in the week, so as to secure complete purification of each day's discharge. Bath rooms are, however, a paltry luxury compared to the perfection of a morning's bath in the lake from a sunny spot. Those who must have a warm bath in the morning, can use a moveable tub, and have the contents discharged, with the other household wastes, over the drainage area in the woods. As for water closets, they are an abomination. A body of property owners, such as the Muskoka Lakes Association, ought not, and perhaps does not, allow them; and detached island holders in larger areas, if they have any real appreciation of the true charm of this way of life, which is its absolute purity, will abhor them as defiling both the water and the house in which, if they do not exist, it is possible for a few months in the year to live in the certainty that the air of one's room is pure. The ordinary country privy is safe, and need not be very far from the house to be no annoyance. As to the question of privacy, if one is approached by way of the boat house, or men's quarters, and the other is approached by way of the kitchen, or women's quarters, and if both are in the woods, there is nothing left to be desired. Remoteness from the house is of course no drawback in a house for summer occupation only, and rain is as a matter of fact not a feature worth considering in connection with outside privies. It is essential that there should be a quiet place for boats. Some favoured places have a channel or cove near the house, which is quiet in every wind, but a south side is quiet enough at all times for a boat house landing.

All these arrangements presuppose an island or point of some size. The picturesque establishments that one sometimes sees, perched upon a little island, must have many practical inconveniences, and none more than the inability of people to get away from one another. The condition of constant association in idleness is trying, and requires occasional relief to keep it from becoming wearisome or worse.

BY THE WAY.

JUDGING by a recent conversation with a well-known firm of decorators the lot of the painter contractor is not an enviable one. The firm to which the gentleman belongs had not for several years submitted a tender for painting, but recently, at the solicitation of a friend who was building, consented to do so. Their figure proved to be more than one hundred dollars higher than that of the next highest tenderer, who is a reputable contractor. Below these two were a number of tenders of less responsible firms, grading down to very low figures. An insight into the means by which prices have been reduced to such a low level was recently given by the representative of a painters' supply house, who was offering for sale a very cheap paint mixture. Enquiry elicited from him the fact that the chief ingredient was water, which the salesman gravely asserted was being used by many painters as a substitute for white lead, and was said to answer the purpose very well.

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I WOULD like to hear from somebody who can get better value for his money than an architect of my acquaintance who recently designed and supervised the erection of a small country house. The house included a living room 18 x 20 feet, a parlor and three bedrooms each 12 x 12 feet, a cellar full size of house, having stone walls. The roof and outer walls of the house are shingled, exposed boarding being left unplaned. Window frames, doors and door frames were purchased from the mill and painted. The entire cost, inclusive of architect's fees was $650. The entire work was done by a local builder.

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A GENTLEMAN who recently returned from Sault Ste. Marie has told me something about the wonderful progress which that town is making, and which is in a large measure due to the ability and enterprise of Mr. Clergue, manager of the great pulp mills. This gentleman who, by the way, is a bacheior, lives in a house of the block house type, and on the site where a blockhouse once stood. The first story of the building is constructed of local red sandstone, and the upper stories of logs or square timbers. Another peculiarity of this residence is that the heating, lighting and cooking are all done by electricity. The proprietor being also the owner of the electrical plant from which the streets and industries of the town are lighted, and of the immense water power by which the electricity is generated, is in a position to adopt this method of heating, the expense of which would be prohibitive in the case of persons less fortunately circumstanced. Speaking of power I am reminded that Mr. Clergue is now developing by means of canals on the Canadian side 80,000 horse power, and on the American side 100,000 horse power.

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BRET Harte tells the following anecdote, illustrative of the "Child-like and Bland" characteristics of the average Chinaman: "In a certain portion of New Zealand, so runs the story in question, the population is composed mainly of Scotsmen and Celestials. All the members of the Municipal Council, however, belong to the former race, and, as a natural consequence, are in the habit of giving their own country-men the preference wherever opportunity arises. Such a one occurred the other day, when tenders were locally invited to take up a contract for road-making. The work being of a highly remunerative nature a large number of applications for it were received from the Caledonian community. At the meeting of the Municipal Committee appointed to decide the matter it was officially announced, amid loud applause, that the accepted tender was that of one Sandy McPherson, who was thereupon instructed to come forward and sign the necessary documents. To the consternation of the worthy chairman, the individual presenting himself before the committee for that purpose was seen to be a pig-tailed and almond-eyed inhabitant of the flowery land.

PERSONAL.

Mr. Frederick G. Todd, who was formerly with Olmsted Brothers, the noted Landscape Architects of Boston, opened an office in Montreal last January, and the remarkable success which has since attended his profession shows that the Canadian people are not behind those of other countries in their appreciation of that which is beautiful. Mr. Todd is a strong advocate of the natural and picturesque style in treating a place except where the house demands a more formal treatment in the shape of architectural gardens or terraces. As the arrangement of the grounds is studied with regard to its effect on the architectural features of the house as well as to obtain a good effect from the house, Mr. Todd is receiving the steady support of many of the best architects in Montreal.

HEATING AND VENTILATION WITH REGARD TO GREENHOUSES.*

BY ROBT. W. KING, Mechanical Engineer, M. Can. Soc. C.E.

The writer's attention was specially called to this subject in 1886, and 1887 with a view to the application of steam in place of hot water heating in greenhouses. The first experiments were made in the greenhouses of Dr. Roe, of Georgetown, Ont. In 1888, the writer became acquainted with the late Mr. H. Dale, of Brampton, who had in contemplation the building of some houses for cut flowers. A more exhaustive study of the subject was then made, including the designing of boilers for that special purpose. In writing a paper on this subject, it is natural to recall those earlier days, because it was then that the points now to be brought to your notice, were mainly first considered.

In commencing to build a greenhouse plant, and especially with a view to future extensions, the plans for heating the whole or completed plant are one of the first and most important things to be considered. It will invariably be found advisable to modify in many ways the houses or their location in order to obtain the best efficiency and economy, both in the installing and use of the heating plant, rather than to endeavor to adapt that plant to houses that have already been erected, with little or no thought to efficient and economic heating. Since the variations, due to differences in location, are many, it will be impossible in a brief discussion to cover the whole ground, but it will be the writer's aim to convey in a condensed form, the conclusions to which his experience has led him.

In considering the methods of heating to be employed reference will be made only to hot water and steam heating. The former still has many advocates, especially in the shorter or smaller houses, and indeed, it is not so very long since it held the entire field. But, with the majority of large growers it has had to give way to steam.

The efficiency of any plant does not depend so much on whether steam or hot water is employed, or on the class of boiler used, or on various other items often pressed upon one's notice as essential to success, as upon the details, and thoroughness of its individual design and manipulation. There are growers who after changing from hot water to steam, have changed back again to hot water, and then published their experience as a caution to others against steam. Moreover, boilers that have worked successfully in one place have failed to do so in another.

Where steam has failed to give good results and economy in heating, it has been due to fault in the plans or method of installing it. In the earlier days, the methods of installing hot water were well understood while steam was not. This was the case when the writer engaged to make a special study of steam heating as applied to greenhouse work.

In any undertaking it is necessary to consider what are the requirements to be specially provided for. In greenhouse heating it is mainly economy in fuel, and attendance.

Fuel constitutes the main expense account, though attendance is also an important item, especially in small houses. These should have boilers designed to safely carry steam all night. Boilers so designed have proven themselves safer and more advantageous than others depending for regulation on a night watchman. Night watchmen fall asleep sometimes or do not wake up when they should, and so allow the houses to chill or become frozen. In a young business the watching of the fires at night generally falls on the proprietor, and the broken rest so necessitated interferes seriously not only with health but with the proper conduct of business, which requires, for its best performance the stimulus of a sound night's rest.

Coal in some form is the principal fuel employed by greenhouse men, and will therloer be mainly so dealt with in this paper. In the first place it should be intelligently purchased. It is not enough to know by chemical analysis or the statement of an agent that from a certain grade or sample can be obtained the greatest number of heat units in proportion to the price to be paid for it, and as compared with some other coal. It is essential to know that the particular fuel purchased is best adapted to the particular plant it is to be burned under. We burn fuel under boilers for the purpose of conveying as fully as may he possible the heat made by its combustion to the water in the boilers. Therefore the most direct way of testing a sample lot of coal is to so burn a measured quantity and then measure the heat conveyed thereby to the water in the boilers.

Also it is essential to know that the efficiency of the plant generally, and its manipulation is such that a proper or economical duty is obtained from the fuel burned under the boilers.

For these reasons every greenhouse should be provided with means for making evaporation tests or a direct measurement of the heat values obtained per pound of coal consumed. After having expertly determined the best obtainable efficiency of the plant itself in regard to the cost of the heat units absorbed from the fuel, then the grade of fuel and method of firing should be employed that will best maintain that efficiency.

The importance of evaporation tests cannot be too strongly accentuated. Nor is it a very difficult or expensive matter to arrange for taking such tests as far as it is necessary for gardeners' purposes, though to attempt to describe them within the limits of this paper would be too wide an extension of my subject. To make a test reliable for comparison with other plants, there are engineering questions and calculations in bringing all to one common basis of measurement that a gardener not also an engineer would not usually undertake. It would be more practical to consult an engineer, and have him arrange and supervise the first tests taken and leave such instructions as will enable subsequent comparative tests to be made at any other time desired without his supervision. This has been successfully accomplished in the Dale greenhouses at Brampton. Some of the tests thus taken will be referred to in the course of this paper.

Test for efficiency of a heating plant need not be confined to steam heating. In a paper read before the "Engineers' Club," of Toronto, last spring the writer describes a method of testing the efficiency of a hot water boiler in such a way that the results in economy on fuel may be compared not only with other hot water boilers, but also with steam boilers. This paper in question was published in the "Canadian Architect and Builder," and in the "Canadian Engineer" of recent issues.

In designing a heating plant to obtain a high grade of economy in the cost of fuel, the prudent man will find that he must not look with too miserly an eye on the first cost necessary to install such a plant. In order to obtain the abundance of heat necessary for your best success, more has to be expended than in installing a plant that will develop only a small amount of heat at a high cost per unit. This may be illustrated as follows:

Steam boilers with heat passing from front to back have been experimentally constructed in sections, so that the evaporation from each section could be independently measured. It was found that the largest part of the work was done at the first or front sections, while the boiler being made long enough, practically no work was done by the last or back section. Suppose such a boiler divided into two equal sections of such a length that the first half does 75 per cent. of the work in absorbing heat from the fuel burned, and the last half 25 per cent. Now it is evident that you can purchase boilers designed (as amount of surface exposed to fire is to fuel consumed) on the first section plan for about half the cost of boilers built on the plan of the whole or combined sections; but the latter will, though costing you more, give you a saving over the former plan of 25 per cent. in fuel, which may mean over 100 per cent. per annum on the extra cost of the plant as a business investment. By following the first plan you invest your money in the most unprofitable part of the plant and omit the most profitable as regards the cost of fuel, thus seriously affecting the net profits of the business. It will be seen, therefore, that the gardener without any check on what his plant is accomplishing may be working under a serious handicap in ignorance of his possible profits going up the chimney in smoke.

It will be found that the same principles apply to hot water boilers, though steam boilers have a serious impediment as compared with the former in the higher temperature of the ordinary steam boiler surfaces which thus detract from their efficiency or heat absorbing power. This fact was early noted by the writer as a point wherein hot water had the advantage both in economy of fuel and in boiler construction over steam, since in a hot water system the lower temperature of the circulating water as compared with steam made the boiler surfaces better adapted for the absorption of heat. Though makers of hot water boilers discount this objection—and sometimes to an absurd extent—by giving that much less heating surface to their boilers, it still remains a point in favor of hot water heating.

To meet this in steam heating the writer designed and patented plans for using the return water in a gravity system as a cooling agent to apply to the waste gases between the hotter boiler surfaces and the chimney flue, and he considers this princi-

*Paper read before the Canadian Horticultural Association at Montreal, August, 1900.

ple in some shape or other as essential to the best economy in steam heating. This may be proven as follows :

Given, for illustration, that the B.T.U. (British Thermal Units) in one pound of coal are 15,000 and that 1,000 B.T.U. are required to evaporate one pound of water; given also an ordinary steam boiler with an evaporative efficiency of 10 lbs. of water to one of coal consumed : In burning each pound of coal to evaporate 10 lbs. of water we have utilized 10,000 B.T.U. of this 15,000 burned and allowed the remaining 5,000 to go to waste at the flue. In the return water heating plan when carried to its full extent the piping is arranged so that the water of condensation may after having parted with its heat in the houses, return to the boilers at 60°. This can be and has been done with the return pipes lying in the lower and colder parts of the houses. Now in using our otherwise waste gases to raise this water from 60° (F.) to 212° (boiling point) or over, before re-entering the boilers, we are unable to capture from such gases about 150 B.T.U. per pound of water so raised. (15,186 B.T.U. being according to Peabody's tables the amount of heat required to raise 1 lb. of water from 60° to 212° F.) Practically equal to 1,500 B.T.U. for each 10 lbs. of water evaporated or pound of coal consumed. So that in the burning of a pound of coal by this system we have captured 11,500 B.T.U. in place of 10,000 by the other, giving a proportionate saving in fuel consumed, that is to say, 10 tons with return heater as against 11½ tons without. This calculation refers to steam at atmospheric pressure or zero on the steam guage; any pressure carried above this admits of the returns being brought to higher temperature and a correspondingly larger amount of heat units to be saved by this plan.

In installing economizers at Brampton it was found that not only is the feed or return water raised to steam temperature before entering the boilers, but also an additional amount of steam was made, requiring special piping to carry it away representing a saving to be credited to return heaters over and above that already shown.

Having thus shown means for overcoming in a steam heating plant this fundamental disadvantage, we will now consider a point in greenhouse heating where steam has the advantage over hot water. Such advantage consists in the ease by which the steam heat may be regulated and controlled.

In hot water heating the radiating pipes and boilers are necessarily full of water, the pipes usually being of large size and necessarily of larger size than those employed in steam heating. In order to bring the piping to a working temperature by a stated time (a point that has to be determined in advance), earlier fires are required for the evening or night than in a steam apparatus which has only the smaller and empty pipes to bring to such temperature. This, with other causes not necessary here to enlarge upon, causes a comparative waste of fuel in the hot water system. This can be met to a certain extent, but to a certain extent only by making the water pipes as small as possible consistent with necessary freedom of circulation, remembering, however, that if you are depending on a large reservoir of hot water for maintaining an even temperature you are detracting from the reliability of your system in this respect.

With steam heating you can depend for this reliability on the steam pressure which will automatically regulate the fire, so that the necessity for any objectionable reservoir for heat no longer exists, outside of the necessity of placing sufficient fuel in the furnaces to run the plant for the length of time desired. Therefore in order to obtain the full advantage of steam heating in this respect, as small a reservoir of heat as possible should be employed. By encumbering a steam plant with boilers containing an unnecessary amount of water and steam space part of the advantage possible in steam heating will not be obtained even though the boilers when working may show the highest evaporative efficiency.

This principle in economy further applies to the fires themselves. In explaining this point it will be necessary to refer to the different methods employed in firing which will vary accordind to varying conditions and requirements. For a small plant and to obtain the best results of an all night fire, hard coal, being the slowest burning fuel and the cleanest, is recommended. The writer has not experimented with soft coal for this purpose. In order to obtain the effect desired in all night fires the area of grate surface should be carefully proportioned to the work to be done. Therefore in planning a heating apparatus some standard of measurement for the work to be done is first required. This has often been a difficult matter to obtain, but may be calculated approximately on the quantity of piping or radiating surface to be employed to obtain a temperature of 60° (F.) The temperature has to be considered because the same proportion of piping will do more work and consume more steam in a colder house ; while the reverse is of course the case in a warmer one. For instance to raise the temperature an extra 20° about double the quantity of radiating pipe will be required, while it will be found approximately correct to assume that 50% only of additional steam will thereby be consumed, thus discounting the work done by the whole 25%. Like reasoning calls for a corresponding advance in duty for radiating pipes in a temperature of 20° below the standard average assumed of 60° (F.) The amount of radiating surface in the heating pipes then being brought to the common basis of what it would be were the piping all of one inch internal diameter, for all night fires a grate surface of one half a square foot is required to every 100 feet of pipe or with night fireman a one fourth square foot will supply the same amount of radiation. This basis of calculation assumes that the boilers used are of a certain standard in evaporation efficiency.

It will be noticed that no reference to the size or power of the boilers is here made though generally the first question asked is, "Will some certain sized boiler heat my place?" It has already been shown how half a proper sized boiler may heat a place if the proprietor is able to stand a 25% waste of fuel. With this kind of boiler a proportionate amount of grate surface will, of course, need to be added to burn that waste fuel, but the real basis of power is in the measurement of the grate surface, and rate of fuel combustion, the proportions of the boilers affecting mainly the economy and efficiency in absorbing and conveying the heat of combustion to the houses to be heated.

This part of my subject will not be complete without reference to the burning of slack or low-priced coal such as screenings, with automatic stokers, and smoke consuming devices. And trust it may be charitably conceded that it is for the sake of brevity, rather than personal conceit, that I confine my remarks rather to the narrow bounds of my own experience than to attempt to embrace the whole field.

It being proposed to burn under a greenhouse plant soft coal screenings, to the grower's requirements originally referred to must be added the absence of smoke, or the heavier portions thereof, that by falling on the glass would shut out the sunshine, which is more valuable to the grower in winter than the fuel he consumes. The engineering requirements to prevent this smoke as also the waste of gases that produce it and can be burned, are the mixing of such gases with sufficient air, and then bringing the whole to such a high elevation of temperature in the combustion chamber that the gases, more particularly the less volatile, may become ignited and consumed therein. This necessitates a higher rate of combustion than in hard coal burning, and was accomplished after several experiments by reducing the grate area, and proportionately increasing the rate of combustion per square foot of grate per hour. These values may be broadly placed as follows : For all night fires with hard coal 2½ lbs. per square foot of grate per hoor ; with night fireman 5 lbs.; soft coal screenings with automatic stokers 10 to 12 lbs. or over. Other proportioning of the heating plant must be adjusted to correspond on the lines already indicated. In order to illustrate as plainly as possible, exactly what has so far been acomplished, and for the purpose of furnishing a comparative guide to florists in the use by them of the system of measurement by evaporation tests already referred to, the following tests with hard coal, and soft coal screenings, taken by the writer from plants, while in ordinary operation, are submitted :—

BRAMPTON.

	Test, "A" December 31, 1896.	Test "B" June 23, 1897.
Heating surface in boiler, square feet,	450	450
Grate surface	14½	9.4
Percentege of ashes	12⅕%	20%
Duration of test in hours	19	6
Steam pressure in pounds	2	1
Temp're feed water 3015 lbs. at 60° F		
" " " 8835 " at 50° F		60 F
Total coal used from pile	1302	475
Coal consumed combustible	1142	378
Coal used per hour	68	79
Coal used per square fort grate per hour	4.7	8-4
Total water evaporated	11850	3367
water evaporated per hour	624	561
Water evaporated per lb., coal used	9.1	7.08
" " " " consumed	10.3	8.09
" " " " from and at 212° F.	12.12	10.31

Test A. Best hard coal hand fired. Stack 40 feet high.

Test B. Soft coal screenings—not dried—"King" automatic stokers under same boiler and stack.

On the authority of these tests, showing more waste in the screenings lb. for lb. than in hard coal, a correspondingly additional amount of screenings were purchased for the experimental stoker fires, which remaining unused at the end of the first season it was judged that the extra ease in regulating the stoker fires which has already been referred to, produced an economy that balanced the loss of efficiency in soft coal screenings, and automatic stokers as compared with best hard coal, hand fired.

In order better to prevent smoke in burning the soft coal screenings higher stacks (60 feet) have been built, and other changes experimentally made. In fact I am unable to report at the present time that these experimeots are fully complete, so final results cannot be given.

Though advising and afterwards designing and installing automatic stokers at Brampton, the writer was aware that there were other methods in use for burning the cheaper grades of fuel, but we must always have in view the economy of the plant and the saving of labor. As regards the former, the stokers were found capable of giving with such fuel an evaporative efficiency that would pay a high rate of interest on their cost of installment ; that they burned the fuel cleaner ; and that they gave greater ease in regulating the fires. This latter is specially noticeable in the stoker action, fires being brought from a banked condition to almost maximum efficiency in five minutes, and let down in a proportionately short space of time. With proportionate reduced area of grate surface and depth of fuel, there is probably not 25% in weight of the quantity of fuel under combustion, that there would be in hand firing. When the fires are lighted, the gases from the screenings burn in a fierce flame near the entrance of the furnace, and cease burning immediately the automatic feed is stopped, thus reducing to the minimum the heat in reservoir already referred to as effecting economical results.

The regulation of the fires can be automatically controlled by the steam pressure. Ease of attendance is further provided for in the Brampton plant, by the automatic conveyance of the coal to the stokers, as their requirements call for, from bins in the room overhead, holding a day or more supply, so that no coal appears in the boiler room or has to be shovelled into the stokers. The filling of the overhead bins is accomplished by machinery, which removes the coal from any part of the storage shed desired, and deposits it, evenly spread, in the bins referred to. The same machinery is arranged to receive coal dumped into a hopper from the wagons entering the yard, and deposit it at any part of the storage shed referred to, which is made large enough to hold a season's supply, thus enabling the grower to purchase and obtain delivery of his fuel to the best advantage in regard to price and time. The same machinery also receives the ashes from the boiler room, and elevates, carries and deposits the same in a wagon or sleigh ready for further removal. Thus great economy in labor and ease, and convenience in manipulation, have been accomplished from the time the coal enters the premises, until the removal of the ashes produced by its combustion. Ventilating shafts are also provided every 12 feet distance throughout the storage shed to prevent spontaneous combustion of the coal.

Having thus far considered as of first importance, the economical production of heat, the grower must see to it that it is economically employed. Pipes passing through spaces not requiring their heat, must be wrapped by heat non-conducting material in some efficient manner. The radiating pipes must be so arranged in the houses, and provided with shut-off valves, that any pipe, or number of pipes, can be put in or out of action to maintain exactly the heat desired, which should be regulated within a margin of a few degrees. Any over-heating causes waste at the ventilators, that if automatic, will immediately open. If the ventilators are not automatic, the stock may be seriously injured and the heat worse than wasted. The houses must be well built as regards being air tight, and the presence of outside walls which require extra heating, should be as much as possible avoided. The practice now coming largely into use, of putting as much space as possible under one roof, is favorable to the best economy in the use of heat, division may be made in this space by introducing light or glass partitions where required, which do not increase the area of the outside walls.

Some reference should be made to the laying of radiating pipes. Since it will be impossible to embraco all the systems employed, we will consider mainly the requirements for laying steam radiation on the gravity and return heating plans recommended above.

As a precaution against fire, the main steam pipes should not be hung overhead in a shed above the boilers, since a fire in the shed might cause them to fall and so disable the heating plant. In such a position they are, moreover, unsightly and in the way. They should rather be placed under the floor level of the houses in a trench made to receive them, and they should be supported in such a way that though the shed might burn down, the pipes would remain intact, and the whole heating plant in working order.

For a site having a slight fall only, as advised by Mr. Dale, the requirements of this system would be best served by selecting the highest point for the boilers, and then sinking the boiler cellar deep enough to give ample drainage from the lowest heating pipe to high water line of boiler, equal to at least one half inch in every ten feet of heating pipes going and returning, with an extra foot or two to spare.

The main steam pipe from above the boilers, commencing large enough to allow for possible extensions, should be carried across the housen, reducing its diameter proportionately as the different houses are supplied, and may be carried after leaving the boiler in a trench made to receive it at its upper level. This pipe should fall from the highest point above the boilers, and be relieved of condensation at its far end by a return pipe running under it at the bottom part of trench, and direct to the water space of boiler, avoiding the return heater. From this main steam pipe are taken the feeds to the headers of the coils of heating pipes in the houses, on the basis of say a 2 inch pipe to supply 1000 feet of 1¼ inch pipe, as given by Mr. Dale. A single 1¼ inch pipe may run 400 feet, enabling houses to be built to this length when using this size for radiating pipes, or to a length of 200 feet when using radiating pipes of one inch internal diameter. Or houses may be double this length by having the main across the centre, instead of the ends of houses, the pipes and houses falling away from both sides. A greenhouse is now being built at Brampton in this way, 830 feet long, using 1¼ inch steam heating pipes. With a large main the feeds to coils may be tapped direct into the pipe at any points desired.

It is preferable in the return heating plan, to run the radiating pipes to fall all the way from the highest point where start is made, so as to carry the condensation with the steam and discharge it at the far ends of the houses. Some ingenuity may here be employed to abstract the heat in the water of condensation before returning it to the reheaters.

In short houses, the returns for each house may be gathered in one or two pipes and returned inside their houses to enter a special main return pipe in the cross trench before mentioned, and then pass to the return heater, but in long houses it would necessitate possibly a deep trench being made to receive it in each house. To meet this objection the following method, as one of others that may be devised, is submitted. In carrying steam 400 feet in an 1¼ inch pipe, it will be found a certain pressure is required at its entrance end to force steam of no pressure to its further end. The exact amount the writer has not determined, but as the temperature of steam falls with its pressure, it follows that there must be some falling off of heat at the further end of a long house so heated. Now this may be counteracted by leading the return pipe of each coil, in a single loop, back part way up the house, returning again and joining with a main return pipe running across the houses at their lower ends. This main return pipe will then, by one trench only, length ways of houses, conduct all cold returns to the reheater. By following some such plan as this, the extra cost or trouble involved will be well repaid where the return heating system is in use, by the saving in fuel thereby, as illustrated in a previous part of this paper.

VENTILATION.

In regard to ventilation the requirements for greenhouse work should be understood better by the grower than by the engineer. It is the latter's duty only to incorporate into his machine if automatic, such action under varying conditions as the grower may dictate. If his machine is not automatic he has simply to construct such a mechanism as will the most easily, with due regard to the expense of installing it, open and close the shutters at the will and by the effort of an operator.

When undertaking to construct an automatic ventilating apparatus for greenhouse work it was given to the writer that the requirements of the grower were a more even regulation of the ventilating shutters at all times, than could be obtained by human attendance, the machines required to be capable of adjustment to maintain any desired temperature within a variation of not more than about 4° of heat and to give also a graded movement while acting in the limit referred to. For instance, should the temperature rise say 1° causing the machine to operate, the shutters must open steadily that proportion only, namely one-fourth of their

full opening, and stay at that point till further change in temperature called for further movement. Any erratic action of shutters such as being put up too high, to be lowered again too low when fall in temperature occurs, that must then naturally take place, causes drafts, and alternate overheating and chilling of plants.

The machine must pull down as well as hold up the shutters. In carrying out the latter point in Brampton it was found advisable to introduce a spring in each connecting rod to the shutters, so that should a piece of ice or other obstacle be in the way of any individual shutter closing, the others could close, and in the case of ice or snow being in the way the continued pressure of the closing shutter would eventually succeed in thawing it out when this shutter would automatically and individually close.

In principle the mechanism consists of a double action hydraulic ram operated from the water pressure (required in green-houses for watering) to actuate the shutters controlled by a delicately constructed double acting and graduating valve which is itself operated by a powerful thermostat moving its operating finger to and fro as heat changes occur.

There are times in the season when heat may be out of houses when it is desirable that shutters should not entirely close at night, since in such case dampness and mildew might result. Under such conditions a stop is arranged to prevent an entire closing of shutters to any desired limit.

The introduction of automatic ventilation in the Brampton plant was simply a natural following of a leading mind, and whose absence to day is mourned as that of a brother indeed who has departed and gone before to that rest to which we all are hastening, whose aim was in accord with advanced and even advancing minds engaged in solving such economic problems as further the best interest of the human race. For him the best was not too good, while every detail of his business was carried out with that thoroughness of which the success that followed his efforts speaks. For him it was enough that ventilating shutters could be better and more economically operated by an automaton than by human attendance, resulting in his having installed to date some fifty-two automatic machines in the Brampton plant referred to herein.

The advantages of automatic ventilation are there obvious. Muscles of iron grow not weary of their task. They sleep not, and never forget. Like a clock keeping track from day to day of the fleeting hours of time, so automatic regulation is always prepared for operation. It may apparently sleep through the winter months, but it starts into action with the first peep of spring. It bows its head to passing clouds and closes out the chilly winds, effectually relieving the grower of one more care, and asks no pay for its services other than the small amount of water under pressure required for its operation.

ILLUSTRATIONS.

(1) GATE LODGE, UPPER CANADA COLLEGE, DEER PARK. (2) WORKINGMEN'S COTTAGES, BELLWOODS AVENUE, TORONTO.—SYMONS & RAE, ARCHITECTS.

PROPOSED RESIDENCE ON DOVERCOURT ROAD, TORONTO.—A. FRANK WICKSON, ARCHITECT.

SUMMER RESIDENCE IN LAKE JOSEPH, MUSKOKA.

The foundation in field stone is carried up in places to form the walls. The walls are of timber framing, filled in with brick or shingles. The shingles throughout are dipped in Cabot's creosote stain, weathered shingle color. The interior of the living room is in pine toned down to a dark color. The upper wall is rough trowelled grey mortar.

HAMILTON ART SCHOOL.

A hand-book of information relating to the Hamilton Art School has been published by the authorities of that institution. The introductory chapter states that the object of the school is to provide facilities for the study of fine and technical art, to enable the students of Hamilton and its immediate vicinity to obtain instruction at least equal to that obtainable in any high class art school, and to charge for the same the lowest possible rate of fees; thereby saving the expenditure of a large amount of money and possibly foreign residence as well; also to provide technical instruction during the evening at an almost nominal fee for those whose trades prevent attendance at day classes. The premises were specially designed for art school work. The rooms are well heated and ventilated, lighted by electricity, and fully equipped with casts, models, copies and appliances for teaching every branch of drawing, painting (oil and water color), modelling, designing, carving, architecture, building and machine construction and the mathematics required for the same. Mr. S. John Ireland has been re-appointed principal of the school for a term of years.

Branch Office of the CANADIAN ARCHITECT AND BUILDER,
Imperial Building,
MONTREAL, Sept. 10th, 1900.

The annual convention of the Quebec Association of Architects was held in their rooms on Sept. 3rd and 4th, and although the attendance was small the meeting was one of considerable interest. A full report will be found in another page. Professor Capper in his presidential address dwelt upon the advantages to be gained by architects in having a university education, though only as part of the general system and not in any way to do away with the practical side of the work which can only be acquired properly in an architect's office and on the actual buildings in progress.

This is an important question and one that should be carefully studied in view of the younger generation about to enter the profession; especially is this the case in the province of Quebec where the profession is now a close one.

In the university education the student has the advantages of masters who have studied more especially the theoretical and artistic side of the profession and are no doubt in most cases more adapted to teaching, with all the necessary materials for so doing at their hands, than is a busy practising architect who can as a rule give only a few minutes each day to his pupils, and who have therefore of necessity to rely for their training in more or less a haphazard manner—the amount of their education relying considerably on their own anxiety to study or lack of same, and the good nature and willingness to teach on the part of the draughtsmen. For these reasons it is probably preferable for a student to receive an academic training for the first two years of his course and for the following two years to work in a practising architect's office. He will by this means enter an architect's office with sufficient knowledge of the rudiments of his profession to be able to grasp the meaning of the work that is going on around him and therefore to be able to take full advantage of the practical side of his profession. This manner of educating an architect is similar to that in vogne in the medical profession. First the theoretical academic course and then the practical hospital training. Surely if architects only looked more often at the higher phases of their work there would be less poorly designed detail, fewer badly proportioned columns and ill conceived carving to be seen on our streets. If architects would only remember that their work consists not only in making a pretty sketch, but also in carrying out the details in such manner that every moulding and column shall be proportioned so as to be pleasing to the trained artistic eye, there would be less work that violated all the true canons of art. Erecting buildings with faulty detail similar to that which one expects from a "jerry builder" should be despised by members of the profession, and the training of the younger men should be made with a view to obviate the possibility of such work and to train them so that inharmonious schemes of colour and ill-proportioned mouldings and other details is as objectionable to their trained artistic eye as a false note is to the ear of a musician. This, no doubt, should be unnecessary to state, but unfortunately our streets show us that the artistic sense of many of our architects is far from what it should be, and it is this very stigma on our calling that the better education of the younger members of the profession is expected to eradicate. No doubt the tendency is towards improvement, but there is still a vast deal to be learned by many of our

architects as well as the general public before these intolerable "designs" which afflict us on every hand (as Prof. Capper expresses it), are eradicated.

It is the architects who have the work of teaching the public on their hands and it is their duty to erect good and refined structures, so that when the public pass by they will soon become, (even if not at first), gradually filled with the quiet beauty of the work so that they will learn to appreciate the superior design over the poorer but oftentimes more ostentatious building.

In reference to the attendance at the meetings it would not be unfair to state that it was far from satisfactory. At the meeting on Monday morning when the election of officers for the ensuing year was held, and which usually calls forth the largest attendance, only 22 members were present out of a membership of 123. This can hardly be called a creditable showing and it would doubtless be well for the Association to look well into the cause of this lack of interest.

There are several reasons which at first sight might be suggested, all of which no doubt may be partly the cause: 1. The unwillingness on the part of most members to lay aside the calls of private practice with its resulting profits for the good of the profession as a calling. 2. The tendency to re-elect the Council or the majority of the members of it, as has so often been the case in past years. An improvement might be suggested so that no member of Council can serve more than two years unless a space of three years have elapsed. By this means the changing of the council would be compulsory and would therefore no doubt tend to more interest in the elections. 3. The lack of any attractions to draw numbers together. In the past year according to the annual report, no general meeting was held but only Council meetings, so that for the past year at least the only privilege members had was that of being able to use the reading room. This, no doubt, to a good many of the members seems hardly commensurate with what they should receive in return for their annual fee. Surely something that would be attractive to a large proportion of the members could be held during the year. Lectures have been tried, we believe, and not found successful, but were not the lectures even among a certain clique? It might be suggested that lectures be given by outside persons who have made a special study of their branch—on Electricity by an Electrical Engineer; on Skeleton Construction by a Civil Engineer; Cements by one who had made a special study of Cements; Decoration by an artist, and so on—allowing members to bring friends who are interested and having a short discussion started by two members who would be asked beforehand to lead the discussion so that it would not be likely to drag. These papers with the following discussions could be printed in the form of transactions of the society, which ought to be a series of valuable papers on subjects of interest to all members. The subjects are almost endless, but great care should be taken and every effort made to procure the man who is best qualified to speak on the particular subject in question. One more suggestion that might be made would be that an annual meeting should be held in which members would be invited to ask their friends to some lecture that would be of special public interest—such as the decoration of the home, designing of furniture, etc., showing the difference between good and bad designing. At this lecture an exhibition of architectural pictures could be held and designs of decoration, furniture, etc., by outsiders who have and are endeavoring to raise the standard of such work. Invite the honorary members and their families, the members and their friends, and make this meeting a popular success, and the members will be only too glad to come. Endeavour to make at all risks the first meeting a success and the others will become a simple matter.

The exhibition of architectural drawings held in the rooms of the Association during its annual meeting was hardly a representative one. This it was hoped was on account of the architects being too busy, but it is seen that two of the busiest architects in town are the best represented, so that the cause must be looked for elsewhere. Messrs. Hutchison & Wood had a very good water colour drawing of the new C. P. R. Telegraph Building now being erected at the corner of St. Francois Xavier and Hospital Streets. Also a large one of the McIntyre block on Victoria Square, and a pencil sketch of additions to the Ottawa Hospital. Messrs. Taylor & Gordon were represented by a water colour sketch of a branch bank for the Molson's Bank, also their bank at Vancouver, the branch bank of Montreal, on Notre Dame Street, Montreal, the Nurse's Home connected to the General Hospital, Montreal, and several photographs of some of the buildings at McGill College. Several of these drawings however had been exhibited before.

Some of the student's work at the architectural classes were exhibited on the tables. Among the designs were noticed one for a theatre and one for a public library. The work was of a high order and it is hoped that more may be heard of these students in the future at the rooms of the Association.

Over the president's chair was hung a very effective water colour sketch of a house at Cote de Nieges, for H. L. Rutherford, Esq., by Mr. C. B. Patterson, while Messrs. McDuff & Lemieux had a drawing of a more prosaic, but no doubt not less useful building in the form of a shirt factory for Tooke Bros. at St. Henry.

Mr. Doran, our representative for mayoralty honors at the last elections, showed a pen and ink drawing of the Catholic High School.

CANADIAN BUILDING MATERIALS AT PARIS.

The Canadian exhibits of materials used in the building trades at the Paris Exhibition, according to accounts to hand, are on the whole, representative and a credit to Canada. That Canada has won the grand prize for its forestry exhibit should be a source of pride to all those interested in the progress of this country, and it is hoped that this exhibit may be used in the future in a more permanent manner by being placed, or at least a portion of it, in the Imperial Institute. The exhibit includes 48 54-foot deals o tbe principal Canadian woods, ⅓ of each deal being polished, ⅓ waxed, and ⅓ simply planed. This is a sensible, business-like method of showing the different varieties, and one likely to be of interest to those using or likely to use Canadian woods. In other building materials Canada is well represented, the province of Quebec in particular having the following exhibits:

Granite from Stanstead, Mt. Johnson, St. Philippe and Riviere de Pierre.

Serpentine from Calumet Island and various points in the eastern townships.

Slate from the New Rockland Slate Co. Works.

Marble from Dudswell and Philipsburg.

Sandstone from Dudswell (Flagstones) and Beauharnois.

Limestone from Montreal, Lacheviotiere, Mt. Ottawa, Pointe Claire and Caugnawaga.

Brick from Laprairie and fireproofing from the Montreal Terra Cotta Co.

The above, although not a complete exhibit by any means, is a fairly representative one, and the other provinces appear to be about equally represented.

Considering the wealth of her natural resources, Canada should look for a wider field than her own, or, in other words, the export trade should be carefully inquired into and made use of if her resources are to be utilized on the most advantageous terms. The home market is small and does by itself hardly warrant the expenditure of large amounts of capital in working quarries and mines with the most modern machinery, and it is only with these modern appliances that this country can compete with the outside world. It is therefore a question of great importance whether one large concern with capital centralized cannot work to better ends than can several small firms each fighting against the other in, generally speaking, a purely local market. Take for instance the granite industry—this is one in which to make a success on a large scale it is necessary to have the latest machinery, derricks, etc., and every thing in the way of locality, railway facilities, good and abundant stone, etc., in its favor. To procure all this needs capital, and to get returns on large amounts needs a large field, and in Canada this means in many products an export trade. It would be wise, therefore, for Canadians to study well the possibilities of creating an export trade. The government have done a good deal to forward the possibilities of manufacturers, etc., being able to make enquiries of the trade possibilities in other countries by appointing commercial agents in different parts for this very purpose, who are always willing to give information to those interested in the local requirements of the districts they represent. A list of these agents is appended:—

J. G. Colmer, 17 Victoria street, London, S.W., England.
Harrison Watson, Canadian Section, Imperial Institute, London.
G. H. Mitchell, 15 Water street, Liverpool, England.
H. M. Murray, 52 St. Enoch Square, Glasgow, Scotland.
W. L. Griffith, 10 The Walk, Cardiff, South Wales.
Thomas Moffat, 24 Wale street, Cape Town, South Africa.
J. S. Larke, Sydney, N.S.W., agent for Australasia.
G. Eustace Burke, Kingston, Jamaica.
Robert Bryson, St. John, Antigua.
S. L. Horsford, St. Kitts, agent for St. Kitts, Nevis and Virgin Islands.
Edgar Tripp, Port of Spain, Trinidad.
C. E. Sontum, Christiania, Norway, agent for Sweden, Denmark and Norway.
D. E. Cosli, 75 Marche, St. Jacques, Antwerp, Belgium.

Mr. Chaussee, the new city building inspector for Montreal, has already increased in a marked degree the efficiency of his department, and expects to be able to increase the revenue sufficiently o make the department self-sustaining.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

THE annual convention of the Association was held on September 3rd and 4th in the Association's rooms, 112 Mansfield street, Montreal. The President, Prof. S. H. Capper, presided. Among the members present were the following: Messrs. Charles Baillarge, A. M. Sigouin, G. E. Tanguay, J. P. Ouellet, P. A. Lefort, C. Dufort, J. O. Turgeon, A. T. Taylor, A. Raza, L. Lemieux, G. A. Monette, J H. Lebon, E. Maxwell, Alcide Chausse, A. H. Lapierre, J. S. Archibald, Raoul Lacroix, Jos. Venne, J. R. Gardiner, W. E. Doran and M. A. Hutchison.

PRESIDENT'S ADDRESS.

Professor Capper, the retiring President, in the course of his address, dealt with the subject of the University education of architects for their professional career. Professor Capper said: The training that a student can obtain at a University is necessarily of a special kind; it leans to the theoretical side; it can never supersede the practical training acquired in an office and on the actual work, as it rises in material construction. But it is not a question of one training at the expense of the other; both are needful; in every profession it is the same, and in our own profession, with its noble traditions extending back almost to the dawn of our civilization, the scientific and aesthetic side of our training cannot be neglected without crippling, and often stultifying, our work.

Why is it that we see around us in this comparatively young country so many poverty-stricken designs? Why should we have to bewail artistic feebleness; work that is weak, faulty and bad; worse still, much that is pretentious and meretricious; at times, positively frantic abortions in architecture?

One cause, at least, is to be found in the lack of definite training in design, during the years when a student is getting his first insight into the work of his chosen profession.

I do not refer to the sins of the speculative builder, whose intolerable "designs" afflict one on every hand. But take a glance at church architecture.

Quite recently I travelled through parts of England and Northern France, making my way back to Canada. And, as I stood on the steamer's deck coming up our magnificent St. Lawrence, I could not but contrast the appearance of our Canadian country churches with the old work on the other side.

Age, it is true, and historical association will invest many a commonplace building with a certain charm. That will not, however, suffice to explain the difference in total impression produced, and I am bound to say I do not feel that the work in church architecture on this side, in spite of the very large sums that must have been spent, can bear comparison artistically with the quiet, unaffected, utterly unpretentious dignity and charm of similar but older work in France and England.

Yet we ought in these modern times to be able to do as well, nay, better than our fathers did. In a new and young country, there ought surely at least to be found a freshness and vigor of design sufficient to give character and value to architectural work; for it is character that makes our work impressive.

I am far from wishing to overlook much satisfactory and able architecture. But why is it that too much of our work in Canada to-day is incontestably less effective than it ought to be? I am persuaded that it is due, in many instances, to inadequate training on the aesthetic side.

There are some, I know, who oppose such training as theoretical and academic, and, therefore, worse than useless; there are others who say such training stifles genius; there are even others, I am afraid, who are in blissful ignorance that training on this side is needful to a modern architect at all.

I therefore earnestly ask this association to consider carefully on behalf of the younger men, the question of the best training, at the outset of their career, for their work in life.

I am myself most strongly convinced of the vital need of just this so-called theoretical, academic and unpractical training. I have spoken of our profession as many-sided: I know of no profession that is more so; and this, the side of artistic expression, that is, the side that must perforce appeal to one and all who see our work and experience the impression produced by it, is in some ways much the most enduring, the most characteristic side of our art. And I have sought consistently to emphasize and promote and develop such training in the fullest measure, convinced that therein lies the true function of a University training—not to attempt to supersede in the slightest the absolutely essential training in the office, on the scaffolding, in actual practical work, but to supplement that all-important training by the equally important education on the scientific and aesthetic side, which cannot be acquired in offices or workshop; which can only be acquired by academic study, but without which an architect is but half fitted for his calling.

The Council submitted the following report, referring to the work performed by that body on behalf of the Association during the year:

TENTH ANNUAL REPORT OF COUNCIL.

GENTLEMEN,—Ten years ago, when a few fellow-members of this city, moved by a concourse of opinions and wishes, often expressed in private, undertook to unite the volitions and direct not only the studies but also the future aims of the profession, in its own interest of course, but principally to give more security to the public, the idea was accepted by some with mistrust and by others with an open spirit of hostility.

A body of serious and influential members of the community accused the architects of illegitimate ambitions and secret aspirations towards the formation of a new Order of Labor Knights in order to increase the already exorbitant fees which the powerful Association collects from that poor and honest class called speculators and jobbers.

As adversaries of the idea were to be found among the very founders of the Association, it is not to be wondered at if the building public, always impressible and nervous when their interests are at stake, should have felt diffident.

We must acknowledge that among the promoters of this project, who worked so earnestly for its success, who did all the preliminary labor, so difficult and sometimes so unpleasant in organizations of this kind, there are some, we might say all who admit that there is more, much more, to be done, before the idea will be found acceptable to everybody.

Nevertheless, such as it stands at the present time the Quebec Association of Architects has received many adhesions to its project; has met with great encouragement in its field of action on the part of the most eminent societies. The R. I. B. A., the Central Society of Architects of France, the Royal Institute of Antwerp have all honored us with their correspondence and invited us to correspond on all subjects of actuality.

La Construction Moderne (an architectural review from Paris), in an article signed by the eminent architect and writer, Charles Lucas, has even thought proper to give part of our Constitution as a model for the regional societies of France. We have been specially congratulated for having agreed on a fundamental basis and for having obtained from our Government a Charter which enables us to accomplish more in the near future.

As to the interior details of the administration the Council of the Association has endeavored, and succeeded to a certain extent, in organizing the Library Department. As already stated at the last annual meeting we have made an arrangement which enables us, under certain conditions, to have access to McGill University's Architectural Library, Westmount's Municipal Library and the Library of the Association of Arts.

The Library of our own Association contains 181 volumes, the value of which you will be able to judge by consulting the catalogue which will soon be distributed.

The rooms of the Association have been regularly opened to the members, except during the vacation months of July and August. It is to be regretted that a very limited number of members availed themselves of the opportunity. The Council going out of charge begs to suggest that students following an office be supplied with a special card giving them free entrance to the library.

The inauguration of the rooms of the Association took place on the 30th October, 1899. On this occasion Prof. S. H. Capper gave a very interesting lecture, illustrated with stereosopic views, before a large number of architects and invited guests.

The Association had been invited to make a Canadian exposition of Retrospective Architecture at Paris, but unfortunately the time was too short to organize a decent exposition. The idea of a local exposition had also been suggested but did not succeed, the members being too busy with the works of the season to have any time left to organize it properly. This idea, however, has been held over until the present meeting with more or less success as you will be able to judge for yourselves.

Thanks, we will not say to the just demands of the Council of the Association, but rather to the good sense of the public, the idea that the Inspector of Buildings should be an architect has been accepted and you are all aware of the changes for the better which the present incumbent has made since he came into office.

The proposed Building Regulations which had been prepared some years ago by the Council of the Association has at last, after many trials, come before the City Council of Montreal. Without wishing to prejudge the case we believe that all the aldermen who have any experience in construction are in its favor, while those who delay its adoption are not so much against the principle of New Regulations (they admit that a New Regulation is needed) as against certain details which can easily be arranged if the City Council takes into serious consideration such an important study.

As to the intricate question of members in arrears and of unqualified parties who practice illegally, measures have been resorted to of which we will not now speak because they are of a private character, but the Association may rest assured that the day is not far off when this question will be regulated in a satisfactory manner.

The examinations held during the year have been specially interesting both by the number and quality of the candidates. The examination papers remain in the archives of the Association, where they will form a very interesting record.

At the suggestion of the R. I. B. A., and through the medium of one of its members, Mr. A. T. Taylor, former president of our Association, a Board of Examiners of the eminent Institute has been organized in Canada. Our president, Prof. S. H. Capper, Mr. A. Raza, former president, and Mr. A. T. Taylor, acting also as secretary, have been appointed examiners for the Province of Quebec. Two other members, completing the Board, are chosen among the members of the Ontario Association.

In the absence of the rich traditions of honor and integrity which prevail among the European Architects, the Association felt keenly the want of a code on professional ethics, and at the last annual meeting a commission was appointed which is now ready to make its report. It is to be hoped that all unite will to give force of law to a measure of such importance which will complete and give more force and stability to the tariff of fees which has been distributed in the course of the present year.

All the members of the Association should endeavor to observe strictly this tariff in order to give it force of law by custom.

It has already been proposed by the Builders' Exchange to form joint commissions, whose purpose would be to study, in order to render them more comprehensible and more useful, certain customs, certain relations, in order to facilitate the regulation of questions arising between organizations interested in the construction industry, and also to define the different responsibilities.

Two members of this Association have resigned: Mr. E. C. Larose, who is now practising in Ontario, and Mr. J. A. Dechamps, who has decided to transfer his activity to another field of labor.

The Asssociation has at present 123 members, of whom two registered since the last annual meeting, after passing the necessary examinations.

There was no general meeting during the year, but there were 3 special meetings and 11 regular monthly meetings of the Council.

S. H. CAPPER, President.
G. A. MONETTE, Secretary.

REPORT OF QUEBEC SECTION.

G. A. MONETTE, ESQ., Architect,
Sec. "P. Q. A. A.," Montreal.

SIR,—The undersigned, officers of the Quebec Section, P. Q. A. A., hereby have the honor to submit to the Council of the Association the following report for the year 1899-1900.

On the 27th of December last, the Quebec architects met at the City Hall, for the purpose of electing their officers for the ensuing year, M. G. E. Tanguay presiding. M. G. E. Tanguay has been re-elected President, and M. Jos. P. Ouellet, Secretary. The latter has also been appointed Treasurer of the Quebec Section.

M. Thomas Raymond, who had withdrawn from the Association, has come back to it, and is again a member of the Quebec Section.

Nothing of special importance have been done this year by our Section.

The Quebec architects, together with their Montreal confreres, have discussed, compiled and submitted to the Council their opinions regarding a certain Code of Professional Ethics, the adoption of which is not done yet, on account of the importance of the questions discussed, and the difference of opinions on many points.

During this year again a new effort has been made towards the approval of our Schedule of Charges (somewhat modified) by the Lieutenant Governor in Council, so as to make it law. All the Quebec members were unanimous in approving that Schedule, as modified, and a copy of same has now been distributed to all the members of the Association, who have bound themselves by their signature, to observe it in all points.

Besides these questions of general interest for the Association, the Quebec Architects have several times met to discuss others, rather local, but by no means less important for them; the consideration of which is still progressing.

The above respectfully submitted.

JOS. P. OUELLET, Sec. Q. S.
EMILE TANGUAY, President Q. S.

Quebec, July 17th, 1900.

The treasurer presented his report which was found to be satisfactory and adopted.

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There is one point upon which I am unable to come to a decision, not having any data on the subject; it is this:—will the better ventilation of the public sewers so purify them as to render harmless the air which passes through them? If it will, then there can remain no valid objection to the change. But assuming that sewers are foul and dirty and that consequently the air passing through them is also foul, the change could not be made.

The chief danger of such a system is that it depends for its efficiency to exclude sewer gas from our houses, on the perfect construction, and maintenance in perfect condition, of the drains and plumbing, for these will then have become conduits to carry off the foul air from the sewers, and any defect, such as a broken closet, a broken drain, clean-our screws carelessly replaced or forgotten entirely, and soil pipes frozen over where they terminate above the roof in very cold spells, will cause the building through which they pass to become, as it were, a part of the sewer ventilation conduit to the detriment of the occupants thereof.

Vacant houses may also serve as sewer gas conductors to adjoining houses (in a row or block of houses). The traps become unsealed by evaporation, or are emptied to prevent freezing, thus permitting the free escape of sewer gas into the house, from which it may be forced into the houses occupied on either side by the difference in atmospheric pressure, caused by the heating of the occupied houses—this being facilitated by the freezing, or partially freezing over of the soil pipe terminus above the roof.

A case occurred a few winters ago which well supports this theory. A builder had, late in the year, completed a fine pair of semi-detached houses, in which the main drain trap had been omitted (which is permitted under the city by-law under certain conditions), and because of such omission was unable to sell or rent them during that winter. The traps of the various fixtures were empty to prevent their being frozen and burst, and every time he invited a prospective buyer or tenant to inspect the houses, they detected sewer gas and were so alarmed that the inspection seldom proceeded further.

If the private drains must serve as sewer ventilators, it should be done as described in the Public Health Act, namely, by a pipe continued up the front wall of every building without any connection to it from the inside of building. Where it is desired to avoid the disfigurement of building fronts, this pipe might be allowed to run up the inside of front wall, the main trap being placed between this vent pipe and the house, or just inside the wall of building.

BENJAMIN KIRK,
Plumbing Inspector.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

THE annual convention of the Association was held on September 3rd and 4th in the Association's rooms, 112 Mansfield street, Montreal. The President, Prof. S. H. Capper, presided. Among the members present were the following: Messrs. Charles Baillarge, A. M. Sigouin, G. E. Tanguay, J. P. Ouellet, P. A. Lefort, C. Dufort, J. O. Turgeon, A. T. Taylor, A. Raza, L. Lemieux, G. A. Monette, J H. Lebon, E. Maxwell, Alcide Chausse, A. H. Lapierre, J. S. Archibald, Raool Lacroix, Jos. Venne, J. R. Gardiner, W. E. Doran and M. A. Hutchison.

PRESIDENT'S ADDRESS.

Professor Capper, the retiring President, in the course of his address, dealt with the subject of the University education of architects for their professional career. Professor Capper said: The training that a student can obtain at a University is necessarily of a special kind; it leans to the theoretical side; it can never supersede the practical training acquired in an office and on the actual work, as it rises in material construction. But it is not a question of one training at the expense of the other; both are needful; in every profession it is the same, and in our own profession, with its noble traditions extending back almost to the dawn of our civilization, the scientific and aesthetic side of our training cannot be neglected without crippling, and often stultifying, our work.

Why is it that we see around us in this comparatively young country so many poverty-stricken designs? Why should we have to bewail artistic feebleness; work that is weak, faulty and bad; worse still, much that is pretentious and meretricious; at times, positively frantic abortions in architecture?

One cause, at least, is to be found in the lack of definite training in design, during the years when a student is getting his first insight into the work of his chosen profession.

I do not refer to the sins of the speculative builder, whose intolerable "designs" afflict one on every hand. But take a glance at church architecture.

Quite recently I travelled through parts of England and Northern France, making my way back to Canada. And, as I stood on the steamer's deck coming up our magnificent St. Lawrence, I could not but contrast the appearance of our Canadian country churches with the old work on the other side.

Age, it is true, and historical association will invest many a commonplace building with a certain charm. That will not, however, suffice to explain the difference in total impression produced, and I am bound to say I do not feel that the work in church architecture on this side, in spite of the very large sums that must have been spent, can bear comparison artistically with the quiet, unaffected, utterly unpretentious dignity and charm of similar but older work in France and England.

Yet we ought in these modern times to be able to do as well, nay, better than our fathers did. In a new and young country, there ought surely at least to be found a freshness and vigor of design sufficient to give character and value to architectural work; for it is character that makes our work impressive.

I am far from wishing to overlook much satisfactory and able architecture. But why is it that too much of our work in Canada to-day is incontestably less effective than it ought to be? I am persuaded that it is due, in many instances, to inadequate training on the aesthetic side.

There are some, I know, who oppose such training as theoretical and academic, and, therefore, worse than useless; there are others who say such training stifles genius; there are even others, I am afraid, who are in blissful ignorance that training on this side is needful to a modern architect at all.

I therefore earnestly ask this association to consider carefully on behalf of the younger men, the question of the best training, at the outset of their career, for their work in life.

I am myself most strongly convinced of the vital need of just this so-called theoretical, academic and unpractical training. I have spoken of our profession as many-sided: I know of no profession that is more so; and this, the side of artistic expression, that is, the side that must perforce appeal to one and all who see our work and experience the impression produced by it, is in some ways much the most enduring, the most characteristic side of our art. And I have sought consistently to emphasize and promote and develop such training in the fullest measure, convinced that therein lies the true function of a University training—not to attempt to supersede in the slightest the absolutely essential training in the office, on the scaffolding, in actual practical work, but to supplement that all-important training by the equally important education on the scientific and aesthetic side, which cannot be acquired in offices or workshop; which can only be acquired by academic study, but without which an architect is but half fitted for his calling.

The Council submitted the following report, referring to the work performed by that body on behalf of the Association during the year:

TENTH ANNUAL REPORT OF COUNCIL.

GENTLEMEN,—Ten years ago, when a few fellow-members of this city, moved by a concourse of opinions and wishes, often expressed in private, undertook to unite the voliticns and direct not only the studies but also the future aims of the profession, in its own interest of course, but principally to give more security to the public, the idea was accepted by some with mistrust and by others with an open spirit of hostility.

A body of serious and influential members of the community accused the architects of illegitimate ambitions and secret aspirations towards the formation of a new Order of Labor Knights in order to increase the already exorbitant fees which the powerful Association collects from that poor and honest class called speculators and jobbers.

As adversaries of the idea were to be found among the very founders of the Association, it is not to be wondered at if the building public, always impressible and nervous when their interests are at stake, should have felt diffident.

We must acknowledge that among the promoters of this project, who worked so earnestly for its success, who did all the preliminary labor, so difficult and sometimes so unpleasant in organizations of this kind, there are some, we might say all who admit that there is more, much more, to be done, before the idea will be found acceptable to everybody.

Nevertheless, such as it stands at the present time the Quebec Association of Architects has received many adhesions to its project; has met with great encouragement in its field of action on the part of the most eminent societies. The R. I. B. A., the Central Society of Architects of France, the Royal Institute of Antwerp have all honored us with their correspondence and invited us to correspond on all subjects of actuality.

La Construction Moderne (an architectural review from Paris), in an article signed by the eminent architect and writer, Charles Lucas, has even thought proper to give part of our Constitution as a model for the regional societies of France. We have been specially congratulated for having agreed on a fundamental basis and for having obtained from our Government a Charter which enables us to accomplish more in the near future.

As to the interior details of the administration the Council of the Association has endeavored, and succeeded to a certain extent, in organizing the Library Department. As already stated at the last annual meeting we have made an arrangement which enables us, under certain conditions, to have access to McGill University's Architectural Library, Westmount's Municipal Library and the Library of the Association of Arts.

The Library of our own Association contains 181 volumes, the value of which you will be able to judge by consulting the catalogue which will soon be distributed.

The rooms of the Association have been regularly opened to the members, except during the vacation months of July and August. It is to be regretted that a very limited number of members availed themselves of the opportunity. The Council going out of charge begs to suggest that students following an office be supplied with a special card giving them free entrance to the library.

The inauguration of the rooms of the Association took place on the 30th October, 1899. On this occasion Prof. S. H. Capper gave a very interesting lecture, illustrated with stereoscopic views, before a large number of architects and invited guests.

The Association had been invited to make a Canadian exposition of Retrospective Architecture at Paris, but unfortunately the time was too short to organize a decent exposition. The idea of a local exposition had also been suggested but did not succeed, the members being too busy with the works of the season to have any time left to organize it properly. This idea, however, has been held over until the present meeting with more or less success as you will be able to judge for yourselves.

Thanks, we will not say to the just demands of the Council of the Association, but rather to the good sense of the public, the idea that the Inspector of Buildings should be an architect has been accepted and you are all aware of the changes for the better which the present incumbent has made since he came into office.

The proposed Building Regulations which had been prepared some years ago by the Council of the Association has at last, after many trials, come before the City Council of Montreal. Without wishing to prejudge the case we believe that all the aldermen who have any experience in construction are in its favor, while those who delay its adoption are not so much against the principle of New Regulations (they admit that a New Regulation is needed) as against certain details which can easily be arranged if the City Council takes into serious consideration such an important study.

As to the intricate question of members in arrears and of unqualified parties who practice illegally, measures have been resorted to of which we will not now speak because they are of a private character, but the Association may rest assured that the day is not far off when this question will be regulated in a satisfactory manner.

The examinations held during the year have been specially interesting both by the number and quality of the candidates. The examination papers remain in the archives of the Association, where they will form a very interesting record.

At the suggestion of the R. I. B. A., and through the medium of one of its members, Mr. A. T. Taylor, former president of our Association, a Board of Examiners of the eminent Institute has been organized in Canada. Our president, Prof. S. H. Capper, Mr. A. Raza, former president, and Mr. A. T. Taylor, acting also as secretary, have been appointed examiners for the Province of Quebec. Two other members, completing the Board, are chosen among the members of the Ontario Association.

In the absence of the rich traditions of honor and integrity which prevail among the European Architects, the Association felt keenly the want of a code on professional ethics, and at the last annual meeting a commission was appointed which is now ready to make its report. It is to be hoped that all unite will to give force of law to a measure of such importance which will complete and give more force and stability to the tariff of fees which has been distributed in the course of the present year.

All the members of the Association should endeavor to observe strictly this tariff in order to give it force of law by custom.

It has already been proposed by the Builders' Exchange to form joint commissions, whose purpose would be to study, in order to render them more comprehensible and more useful, certain customs, certain relations, in order to facilitate the regulation of questions arising between organizations interested in the construction industry, and also to define the different responsibilities.

Two members of this Association have resigned: Mr. E. C. Larose, who is now practising in Ontario, and Mr. J. A. Dechamps, who has decided to transfer his activity to another field of labor.

The Asssociation has at present 123 members, of whom two registered since the last annual meeting, after passing the necessary examinations.

There was no general meeting during the year, but there were 3 special meetings and 11 regular monthly meetings of the Council.

S. H. CAPPER, President.
G. A. MONETTE, Secretary.

REPORT OF QUEBEC SECTION.

G. A. MONETTE, ESQ., Architect,
Sec. "P. Q. A. A.," Montreal.

SIR,—The undersigned, officers of the Quebec Section, P. Q. A. A., hereby have the honor to submit to the Council of the Association the following report for the year 1899-1900.

On the 27th of December last, the Quebec architects met at the City Hall, for the purpose of electing their officers for the ensuing year, M. G. E. Tanguay presiding. M. G. E. Tanguay has been re-elected President, and M. Jos. P. Ouellet, Secretary. The latter has also been appointed Treasurer of the Quebec Section.

M. Thomas Raymond, who had withdrawn from the Association, has come back to it, and is again a member of the Quebec Section.

Nothing of special importance have been done this year by our Section.

The Quebec architects, together with their Montreal confreres, have discussed, compiled and submitted to the Council their opinions regarding a certain Code of Professional Ethics, the adoption of which is not done yet, on account of the importance of the questions discussed, and the difference of opinions on many points.

During this year again a new effort has been made towards the approval of our Schedule of Charges (somewhat modified) by the Lieutenant Governor in Council, so as to make it law. All the Quebec members were unanimous in approving that Schedule, as modified, and a copy of same has now been distributed to all the members of the Association, who have bound themselves by their signature, to observe it in all points.

Besides these questions of general interest for the Association, the Quebec Architects have several times met to discuss others, rather local, but by no means less important for them; the consideration of which is still progressing.

The above respectfully submitted.

JOS. P. OUELLET, Sec. Q. S.
EMILE TANGUAY, President Q. S.

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BENJAMIN KIRK,
Plumbing Inspector.

THE BUILDER

[THIS DEPARTMENT IS DESIGNED TO FURNISH INFORMATION SUITED TO THE REQUIREMENTS OF THE BUILDING TRADES. READERS ARE INVITED TO ASSIST IN MAKING IT AS HELPFUL AS POSSIBLE BY CONTRIBUTING OF THEIR EXPERIENCE, AND BY ASKING FOR PARTICULAR INFORMATION WHICH THEY MAY AT ANY TIME REQUIRE.]

Preparing Kalsomine.

THE writer has often been asked to give a formula for preparing reliable kalsomine in plain white and in colors or tints. Experience has shown the following compound to be durable and strong in covering qualities: Soak one pound of white glue overnight in about a quart of clean soft water; then dissolve in boiling water, and add twenty pounds of Paris-white, diluting with water until the mixture is of the consistency of rich milk. This, laid on with a soft brush, gives a fine marble finish to a wall, and will not peel off if the wall is clean and free from any greasy matters before the kalsomine is applied. To give this wash the following tints or colors, add, for lilac, two parts of Prussian blue, and one part of vermilion. Mix thoroughly in a separate vessel, and incorporate with the white kalsomine until the desired tint is obtained. For buff, mix two parts spruce or Indian yellow and one part of burnt sienna. Proceed as before until the right tint is obtained. For a rose-color, take three parts of vermillion and one of red lead; add to the kalsomine in very small quantities until the desired shade is produced. For gray, use raw umber, with a very small amount of lamp-black added, mixing carefully and thoroughly, as greys are difficult to produce. For a fine straw color, mix chrome yellow with a touch of Spanish brown; a pleasing tint will be the result. To make a lavender tint, take a small quantity of Russian blue, mix until a light tint is produced, then add sufficient quantity of vermilion to give it the proper lavender color. The pigments used in these combinations will not fade or change color, and a wall or ceiling finished in any of these tints will have a very pleasing effect.

Finishing Redwood.

ALONG the Pacific coast, and, indeed, in many of the inland towns and cities, redwood and Douglas fir are made much use of in house finishing, and it is well to know how these woods may be finished in order to give them a good appearance when left in their natural state. Both woods may be made to compare favorably with some of the more aristocratic hardwoods when properly handled. For finishing redwood, first make a mixture of one quart of spirits of turpentine, one pound of corn starch, a quarter of a pound of burnt sienna, one tablespoonfull of raw linseed oil, to which add a tablespoonfull of brown Japan. Mix thoroughly, apply with a brush, let the work stand for about fifteen minutes; then rub off with excelsior, fine shavings, or a clean soft rag. After this, the work should stand at least twenty-four hours, that it may sink into the wood and become hard, a process which also hardens the fibres of the wood. After the whole is perfectly dry and hard apply two coats of white shellac, then rub down with fine glass paper until the whole is perfectly smooth; then put on a couple of good coats of herb polishing varnish; when hard and dry rub down with clean water and finely pulverized pumice-stone; let stand a day or two, then clean down with chamois, and rub with a little olive oil and rotten stone until perfectly dry, and if the work has been well done the whole will have a piano finish, and the grain of the wood will show up handsomely. The same mode of finishing may be followed on Douglas fir, only, when the natural wood color is desired, all coloring matter must be kept out of the mixture. If, however, it is desired to stain the fir a cherry color, the following mixture may be used in conjunction with the filler or the formula given above. Mix together, by stirring, one quart of spirits of turpentine, one pint varnish, one pound of burnt sienna; mix with equal quantity of the first receipt, and apply and treat in like manner as described for finishing redwood.

Something on Foundations.

THE foundation of a building should be of such a nature that it will bear the weight laid upon it without compression or flinching. If the soil be of a soft nature, it will of necessity yield or compress beneath the weight placed upon it. If any part of a building be loftier and more weighty than the other portions of it, as in the case of a church tower or steeple, the soil beneath the extra weight will be more compressed than the other parts of the site; hence all that portion of the building will sink somewhat into the ground, and in thus sinking, the heavy part of the building will break away from the adjoining work which will not settle in the same manner. Under such conditions, extra precautions must be taken to prepare the foundations under the tower in such a manner that the settlement, if there be any, shall be equal along the whole line of footings. In proportion as the ground is of a soft and yielding nature, the footings of the building should spread; for if a square yard of ground will bear a ton weight with a certain degree of compression, two separate square yards will bear two tons' weight with the same degree of compression, or they will bear one ton weight with only half the degree of compression, and perhaps less. For ordinary foundations, where the buildings are to be of brick or stone, the footings may be from two to three feet wide and from six to eight inches thick, and laid on solid ground that has been well tamped; but in larger or heavier buildings the footings should be placed on a bed of concrete; the thickness and breadth of concrete must be determined by local features, such as the nature of the soil, weight of the building, and the depth to which frost penetrates. Rock generally provides a good foundation, particularly when the stratum is more or less level. The surface should be levelled, and all broken or decomposed fragments cleared away; any large hollows should be filled up with good concrete. If the rock is sloping, it may be stepped in order to get level bearings for foundation walls. Gravel forms a good foundation, being easily levelled, and not affected by the frost. Sand is a good foundation if dry, and if not liable to escape laterally, or to be washed away by water. Sand or gravel, when overlying clay on a slope, require to have a large drain therein next that side of the building which adjoins the highest grounds, so that the flow of water to the building will be intercepted. Clay, when hard and dry, is usually satisfactory; if on a slope, it is likely to prove treacherous. Hard ground overlying soft ground may frequently be built on, if the pressure is well distributed, and the surface sunk into as little as possible; but when soft ground overlying hard ground is met with, the foundation should be carried down to the hard ground, if not more than twelve or fifteen feet deep. If the soft ground is below that depth, say from twenty to thirty-five feet down, and the building is a heavy one, then piles should be driven into the soft earth, in sufficient numbers to resist the pressure. Made ground is never to be trusted, even though many years have elapsed since its formation. Proper drainage and protection from water is of very great advantage in connection with the strength and durability of any foundation or structure, and this is particularly so in soft soils. On the other hand, water is the main support of a building, and to drain it away is then a grave error. Uniformity of foundation and resistance to compression is of the utmost importance for the purpose of securing the requisite stability, and great care should therefore be bestowed upon the examination of the trenches cut for the foundation walls. All soft places should be excavated and, when possible, filled up with concrete, or else gravel should be dumped in and well tamped down before the footings are laid on. If there should be a soft pocket in the foundation grounds, and the other parts are good and sound, a brick arch may be thrown over it, or, if dry, a steel or concrete lintel may bridge the span, making sure the ends of the lintel rest on ample footings. Always allow the trench one foot wider than the footings, so as to give the mason a good opportunity to get his footings in properly. The ground that is filled in to level up to top of footings should he well tamped, and if weeping tiles are laid along the side of the footings, the earth should be packed around them firmly, having a care that tiles are not broken by the tamping.

For the Bricklayer

BRICKS should be well drenched with water before using, to prevent them absorbing the moisture from the mortar, and to wash the particles of dust and dirt off them. In the summer the bricks should be soaked with water before using, and in winter it is a good plan to have each brick dipped in a pail of warm water. This will tend to keep the mortar from freezing and prevent the water in the mortar from being absorbed. The whole of the walling should be carried up simultaneously when possible. If it is necessary to carry up one part of the wall before the other, the end of the first portion should be "racked back," that is, left in steps, each course projecting more than the one above it, but the sum total of the heights of one part above the other should not exceed three feet, or it may be difficult to make the joints "line up." When the ends of timbers such as joists, tie-beams, bressummers or other similar pieces are built in brick walls, they should rest in recesses formed by galvanized iron shoes, so that a circulation of air may have due play round the timbers. Wooden strips for nailing the strapping or furring to are preferable to scantling; they should be cut to the thickness of a certain joint, and should not be less than three and a half inches wide, and the bark edge should be well flushed in with mortar. In laying brick copings, the hardest and least porous bricks should be used, and laid on edge, set and pointed in cement. In corbelling, the projections of the courses should never be more than one quarter of a brick, so that each back joint may be kept well within the last course. A less projection is advisable when great strength is required, but in no case where much weight is to be carried is it advisable that the projection of each brick should be more than one-third on the course below. It is a mistake to suppose that semi-circular arches have no thrust. When any arches occur near the end of a wall provision must be made for the thrust. The flatter the arch the greater the thrust. New work should butt against old, either with a visible joint, or let into a chase cut for the purpose, if necessary, to bind them together. If required to be bonded at every alternate course, the new work should be built in a quick setting cement, and each part allowed to harden before being weighted. It is bad construction to use bond timbers for nailing on the strapping, and when it can be avoided it is better to use thin strips between the joints in the brickwork, or to employ wooden plugs; the latter is the better method, but is too costly for general purposes. Struck, or bevelled joints, are the best for general work, and they last longer without being impaired; they are formed by pressing back the upper portion of the joint while the mortar is moist, thus forming a sloping surface, which throws off the rain. The lower side is cut off to a straight edge. Joints struck the other way up are common, but should not be allowed, as they leave a resting place for water. Joints should not exceed three-eighths of an inch in thickness in good work, but in common work, where the bricks are rough and unequal, a thicker joint is permissible; in rough work, the mortar should be quite stiff. Flat or flush joints are formed by pressing the mortar flat, so that the surface of the joint is flush with the face of the wall. In tuck pointing the joints are raked out, and "stopped," that is, filled up flush with mortar, which is colored and rubbed with a soft brick of the same color. A narrow groove is then cut in the centre, and the mortar is allowed to set; then pure white lime putty is filled into the groove, with a slight projection beyond the face of the wall, and a width of about one-eighth of an inch. The thickness of brickwork should be measured one brick for every twenty feet in height. The bond generally in use in the Dominion for ordinary brickwork, is one course of headers to every five courses of stretchers; this makes a pretty solid wall. Drains should be kept as far away as possible from walls that are likely to settle. Four-inch drains are generally large enough to branch into a main drain, for ordinary houses. Hotels, factories, schools and other places where a number of people congregate, require larger branch drains, but the least possible size necessary should be used, as being more self-cleansing than larger pipes. Tile-piping is preferred to iron by many even for fixing inside a house, although it is impossible to find a drain of this material of any great length, that has been used for years, that is not defective in some particular. Iron pipes can be made perfectly watertight, and they have sufficient resisting power to prevent their disruption under ordinary strains.

PRISMATIC LIGHTING FOR THE ILLUMINATION OF DARK INTERIORS.*

By Dr. Wm. H. Greene.

The practical application of the refractive property of the lens or prism to change the direction of light rays passing through it, for the purpose of artificial illumination, originated with the French physicist, Fresnel, who first suggested its use in lighthouses, for the protection of maritime coasts, about the year 1815; and the Fresnel lens in various modifications is to-day solely used for this purpose.

The Fresnel lens is designed for projecting a powerful beam of parallel light upon objects to be illuminated at a distance. The principle of this device is seen in Fig. 1, which shows a central plano-convex lens surrounded

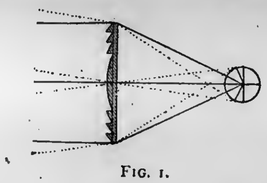

Fig. 1.

by a series of rings or segments of lenses or prisms, to which successively diminishing curvatures or angles are given in order to give them a common focus.

Within the past four or five years the application of this principle has been made, and with decided success, to the illumination of dark interior spaces where the amount of light naturally entering therein is insufficient for satisfactory illumination, and artificial lighting must occasionally or constantly be resorted to.

The requirements of public buildings and modern office buildings in this respect, have been most urgent, and the various devices known generally by the name of "prismatic lights" have been extensively used for the purpose and have proved so useful that in one or another form they have come to be regarded by architects and builders, not to speak of a great number of householders, as indispensable.

It is the purpose of this communication to give a brief review of the art of prismatic lighting, which, at the present time is passing through the active stages of the course of evolution, to which all the arts are subject, in determining the survival of the fittest.

Omitting, for the present, consideration of the vault light for basements and cellars, where but one form of prism, namely, an approximately right-angled prism depending on total reflection for its utility, is admissable, there are two general methods in vogue of installing prismatic lights to meet the requirements of service.

In one of these the sheet of prismatic glass is placed in a window frame in the vertical position, thus taking the place of a window light. In the other the sheet of prismatic glass is installed in a more or less inclined position, projecting outwards from the window opening. This form of construction is known in the trade as a "canopy."

The question as to which of these two forms of installation will give the best results is determined by the extent of the sky opening upon which dependence must be placed for light.

Where this is of considerable area, as for example where the windows face a wide street, the prismatic glass set into the window-frames in the vertical position will give satisfactory results.

Where the windows receive their light from a restricted area, as for example in court-yards, or the side-yards of dwelling houses, and, generally, in the many situations where high walls rising in close proximity cut off the free access of light from above, the projecting, canopy form of prismatic glass is preferable.

Speaking in a general way, the change from the vertical to the canopy form of installation will be indicated when the incident angle of the light falling on the window opening averages 60 degrees from the horizontal plane.

The popularity achieved by the use of light projecting devices of this general nature. has called into existence a great number of patented inventions, some claiming special forms of prism construction (in combination, in certain cases, with a prismatic or lenticular formation on the reverse side of the glass), and of a far greater number of designs, patents and methods of glazing, and other matters of minor detail.

For the purpose of this communication, these minor devices may be left out of consideration, and the several generic forms of prism construction only will be given attention.

These may be divided into two general classes:

(1) Those in which the glass forming the light-projecting device consists of sheets having on one surface a series of prisms or segments of lenses of any desired angle, the back of the sheet being a plane surface, and

(2) Those in which the glass forming the light-projecting device consists of sheets having on both surfaces a series of prisms or lenses.

The prism glass most generally known and used is that of the first-named class.

The action of a section of prism glass of this construction is shown in Fig. 2, in elevation and plan. It

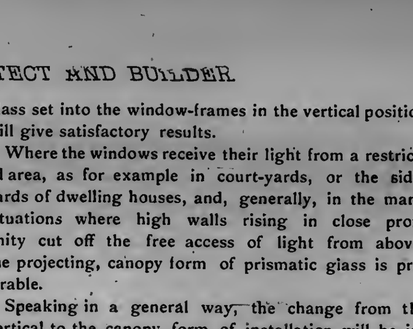

Fig. 2.

is obvious that the general refracting effect of the prismatic surface in this and in the other forms of prism glass will be substantially the same, whether the refractive surfaces of the structure be straight (i.e. prismatic), or more or less curved (i. e. lenticular), irrespective of the angles of the prism sections or of the curvature of the lens segments. It is important, however, that these angles (or curves) be carefully considered, since upon the correct appreciation of this element the light-projecting efficiency of the structure largely depends. Improper angles (or curvatures) may greatly diminish the efficiency of the device, by the dispersion and loss of light, caused by total reflections in the interior of the glass.

* Paper read before the Franklin Institute, and printed in the Journal of the Society.

There is general misapprehension regarding the proper action of light-projecting glass, which needs a word of reference. It is assumed by many that the prismatic glass should be so constructed that all the exterior light transmitted from the interior boundary of the prismatic window, or canopy, should be directed in lines substantially parallel to the boundary walls, floor and ceiling of the apartment, and that the more nearly this condition is realized the closer will be the approach to the theoretically-perfect mode of operation. Some of the manufacturers of prismatic glass endeavor to realize this condition by varying the angles of the prisms uniformly from the center to the edges of the sheets, on the principle of the Fresnel lens.

A little consideration of what is intended to be realized by prism lighting of interiors will suffice to show that this view is an erroneous one and liable to result, in practice, in a much inferior interior illumination than can be otherwise obtained.

This criticism will be understood by stating the general proposition, that the objects of prismatic lighting are, first, to direct as much extraneous light into the interior as possible; and, second, to direct it in such manner as to derive the largest possible benefit therefrom.

In considering the relative merits of parallel and divergent light transmission by prismatic glass, it should be said that practically as much extraneous light can be directed into the interior space to be illuminated by the one as by the other arrangement of prisms or lenses. But when we come to consider the second portion of the proposition, it can easily be shown that the system of transmitting the light in parallel lines cannot possibly be as effective as the method of divergent transmission, and more especially, divergent transmission in both vertical and horizontal planes, and for the following reason:

It is well known that the best effects in interior illumination are realized when uniform diffusion throughout the apartment is obtained. This effect can be secured most effectively only when all shadows are obliterated by calling into requisition the action of the entering light reflected from all parts of the side walls, floor and ceiling of the apartment.

By the method of directing the transmitted light in parallel lines, the ill effects of shadows cast by opaque objects in the path of the entering light will be realized in an extreme degree, as there will be no ameliorating

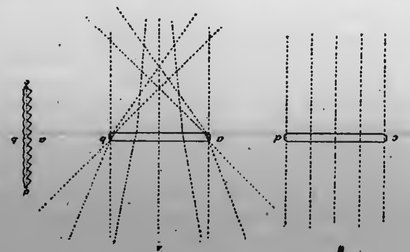

Fig. 3.

influence to counteract and neutralize the shadows by reflection from the bounding walls and floor of the apartment; and an inspection of the condition of an apartment thus treated will disclose this objection at once.

By the method of divergent transmission, while quite as much or more extraneous light is thrown into the apartment as by the other method, its distribution is decidedly more advantageous, from the fact that the repeated reflections from the bounding surfaces of the apartment cause the practical obliteration of all shadows and a practically uniform diffusion of the light to all parts of the interior.

Returning now to the descriptive portion of the subject, the modus operandi of the simplest form of a light-projecting prismatic window is shown in the plan views in Fig. 2, A and B, in which the light from an exterior source falling upon the plane, outward surface of the glass is refracted at the boundary of the interior prismatic surfaces and projected into the room to be illuminated.

Fig. 2, A, which is a plan view of this construction taken on the line a b, exhibits the effect of the light distribution in the vertical plane from the effect of refraction from the terminal portions of the prism, where the influence of the more oblique rays is not counteracted by a modification of the angles of prism from the center line to the upper and lower edges of the glass. Fig. 2, B, is a plan on line c d, showing that the light rays are not distributed divergently in the horizontal plane, but are all directed in parallel planes.

Figs. 3 and 4 represent the action of prismatic glass

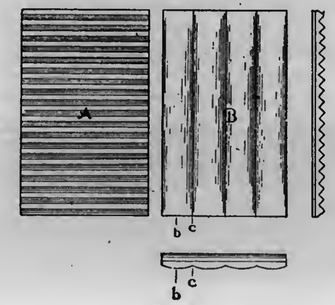

Fig. 4.

of the second class, i.e., in which both surfaces are prismatic or lenticular.

Fig. 3 shows a form of light projecting glass that has lately come into use, and for which certain advantages are claimed over the construction previously described. The sheets in this form of prism glass have one surface furnished with prisms—commonly placed towards the room to be lighted—and the other surface formed of a series of lenses of small curvature, distributed in panel form, parallel to the direction of the prisms. This construction, as well as that shown in Fig. 2, manifestly exaggerates in the vertical plane the divergent distribution of the transmitted light, and consequently operates, so far as it goes, in the correct manner, utilizing the reflecting action of ceiling and floor in diffusing the light.

The construction shown in Fig. 3 possesses one obvious advantage over the several modifications of class 1, namely, that the lenticular form of exterior surface arrests and directs into the dark interior to be lighted a certain amount of the exterior light, which, with the plane exterior surface of class 1 would be lost by total reflection from the exterior plane surface. Practically all of this additional light thus projected

into the dark interior would be gained if the angle of the prism and the curvature of the lens panels were correctly adapted to the length of the apartment to be lighted.

The latest modification of class 2 remains yet to be considered.

In this, the interior prismatic surface of the glass is the same as that just described, but the exterior lenticular panels are arranged not parallel, but transversely, to the direction of the prisms. The details of this form of construction are shown in Fig. 4, A and B, while the modus operandi is best observed in Fig. 5, A and B.

FIG. 5.

The radical difference in the operation of this form of ight projecting glass and that of both forms previously described, resides in the fact that the light distribution in this form is exaggerated in the lateral as well as in the vertical plane. This feature is illustrated in Fig. 5, B, in which B is supposed to be a section of the prismatic glass taken on the line c d, from an inspection of which it will be manifest that the vertical arrangement of the exterior lenticular panels will serve a similar purpose in this construction in relation to the light falling sidewise on the exterior surface of the glass as the lenticular panels in the previous case serve in relation to vertical rays; namely, to arrest and refract into the dark exterior a considerable amount of light in the horizontal plane which would otherwise be lost for useful purposes. All of the light thus collected and introduced into the dark interior by the lateral collecting action of this device is so much clear gain over the devices previously described.

Further consideration will show, also, that if the interior surface of the glass be provided with prisms of uniform angle, determined in each case by the length of the apartment to be illuminated, this form of construction will secure the same advantage in respect of the vertical diffusion of the entering light as will be obtained from the lenticular prismatic construction previously described.

On theoretical grounds, therefore, the last-described modification of light-projecting glass, belonging to class 2, should give the best results if intelligently installed. Comparative practical tests also bear out this conclusion.

An additional and important advantage possessed by prism glass of the last-named construction (namely, a prism plate constructed with prisms on one side and prisms or lens panels arranged transversely on the reverse side) remains to be noticed.

Since all illumination by means of prism glass is thrown from a comparatively low point, namely, through windows, while all other illumination is directed from a point above, the shadows produced by the prisms on objects in a room constitute a disadvantage common to most systems of lighting by means of prisms, as has been noticed in what has preceded. The light-projecting glass last described, however, by reason of its diffusing quality, both in horizontal and vertical planes, largely overcomes this objection. Where two such prism windows are used for the same apartment, the light thrown from one window completely overlaps that thrown from the other, thereby practically obliterating the shadows produced by prism lights of other constructions.

This construction also has the advantage of enabling manufacturers to produce more readily the larger sizes of prisms, from the fact that one surface has projections at right angles to projections on the reverse side, giving a bridge effect, thus adding to the strength of the plate. For this reason, likewise, it is not essential to have the thickness of the body of the glass as great as with other forms; and inasmuch as there is a larger loss of light through absorption in passing through a thick than a thin medium, the loss of light from this cause may be much reduced.

Finally, it may be said that all the various forms of light-projecting prismatic glass accomplish, measurably, their intended purpose of considerably increasing the illumination of dark interiors over what would occur without artificial aid. In the selection of the kind of light-projecting and the manner of its installation, the user should be guided by the personal observation of the effects produced, rather than by the claims of rival manufacturers.

MANUFACTURES AND MATERIALS

A NEW PORTLAND CEMENT MANUFACTORY AT LAKEFIELD, ONT.

THE Lakefield Portland Cement Company, Limited, of Lakefield, Ont., are making progress toward the completion of their plant. Their main building will be 326 feet in length 80 feet in breadth, and 22 feet high, and will be constructed of the new material known as litholite, an artificial stone composed of Portland cement, coarse sand or ground rock, moulded in sand and hollow. The blocks will be prepared of the uniform dimensions 12 inches by 30 and laid in cement mortar. The roof will be a wooden truss sheeted with metal. Their deposit known as Buckley's lake, is known to be one of the most extensive marl deposits in the Dominion, contains about 800 acres, and of a depth of 20 feet and over, is of great strength and purity, and situated about a mile and half a east of the works. A railway is being constructed between the works and the deposit. The marl will be dug by a clam shell digger, and conveyed to the works by a train of iron dump cars and small steam motor.

The Company have purchased the Young's Point mills and water power, and have removed the mills, and are removing also two piers of the dam for the purpose of increasing the inflow to their wheels. There will be four concrete flumes erected each of 22 feet in breadth, abutting against the face of the dam, and with wheel pits 13 feet in depth, so as to afford the fullest relief to the large body of water to be used in the power. The flow from several lakes converges at this point affording a steady and abundant supply.

The William Hamilton Manufacturing Co., of Peterboro' have secured the contracts for the wheels and iron work, and are supplying four of their 68 inch Samson turbine wheels which will all be connected to one shaft, which in turn is direct connected to a 400 k.w. electric generator. The electric power, pole line, telephone line, motors, etc., are being by the built Canadian General Electric Company. The electric plant will combine all the latest improvements known to electric science. Ten electric motors ranging from 10 horse power to 75 horse power will drive the plant.

Machinery will be installed at the present time to turn out 300 barrels per day, but the power will be sufficient to propel, and the building large enough to contain and accommodate a plant capable of turning out additional 300 barrels per day.

Messrs. R. P. Butchart, general manager of the Owen Sound Portland Cement Co., and W. H. E. Bravender, manager of the Empire Cement Works, located at Warners, New York State, and who are joint vice-presidents of the company, are engineering the plant, which will be of the latest construction. The cement turned out by both of these companies, holds first place in the trade, the Owen Sound Company having secured a silver medal for their product at the Paris Exposition, which will be a sufficient guarantee of the excellence of the product of the Lakefield Portland Cement Company.

The village of Lakefield have aided the enterprise by a bonus of $10,000 together with a grant of thirteen acres of land, lying along side the Grand Trunk Railway tracks in the village of Lakefield, also by exemption from taxation, for the period of 10 years.

The authorized capital of the company is $500,000. All of this is expected to be paid up and embarked in the enterprise.

The advantageous position of the company's works upon the Trent Canal and Grand Trunk Railway, its magnificent marl deposits, its splendid water power, as well as the long experience and thorough knowledge of the business by its manager, gives every reason to hope that this company will have a long and prosperous career.

The village of Lakefield have done a wise thing in securing this industry, which will speedily convert the village into a town, and no doubt be instrumental in bringing to the knowledge of the outer world, the many special advantages which it posseses as a location for other manufacturing enterprises. Mr. J. M. Kilbourn, barrister, of Owen Sound, who is president of the company, is summering at Lakefield and directing all the movements for the construction of the plant.

There will be no connection whatever between this Company and the Owen Sound Portland Cement Co., further than in the fact that Mr. Butchart and Mr. Kilbourn and their families hold the controlling interest in both. The management at Lakefield will be largely in the hands of Mr. Alexander Butchart, brother of R. P. Butchart, and Mr. Aubrey Kilbourn, son of Mr. J. M. Kilbourn, who will have charge respectively, of the manufacturing and financial branches of the work.

LITHOLITE.

Litholite, the invention of Mr. Kitchen of Chicago, who have secured patents in twenty different countries, seems destined largely to revolutionize the building trade, as well as to beget a large additional demand for Portland cement. Mr. Kitchen has been engaged for many years in the construction of ordinary concrete work, and has invented and brought into use many useful improvements in the manner of forming artificial stone. His latest surpasses in interest and utility anything hitherto done in the way of artificial stone making. The material used is the best quality of Portland cement, and a mixture of ground rock or coarse sand, which may be of any color desired according to the color of the sand or stone used, and can be shaded as desired, by the use of artificial pigments. A mould is prepared of the size desired to be reproduced. The pattern to be imitated is made of galvanized iron, which is attached to a board and backed up to produce solidity with cement or plaster of Paris, which protected by the iron, forms a strong and durable shaper. The bottom of the mould is covered with a couple of inches of fine clean and damp moulding sand. Upon this is impressed by simply pounding the design to be formed, which may imitate any description of cut stone work, flowers, faces, animals, or what-not.

The mortar of the consistency of thick cream is then poured upon the sand mould, and of thickness required to be produced, usually from one to three inches according to weight and size of the artificial stone to be made. Board sides and ends are then inserted into the flasks, the centre of which is then pounded with damp sand tightly pounded in. The sides and end boards are then withdrawn, and the material is poured into the space which they occupy, thus forming sides and ends to the block. If it be desired to form a back to the block, adhering to the sides and ends the material is simply poured over the moulding sand of the thickness required, and holes are cut in the back to permit the sand to run out when the block is complete. At the end of 24 hours this block is a beautifully finished, hard, light, hollow stone, which has cost not more than one-tenth of the money which would be required to produce an ordinary stone block of equal dimensions and similar design. The method of construction is so simple that any intelligent person can operate it. A company has been formed of which Messrs. R. P. Butchart, manager of the Owen Sound Portland Cement Co., W. H. E. Bravender, of New York, Mr. J. R. Forster, architect, of Owen Sound, Ex-alderman John Lucas of Toronto, Mr. J. E. Murphy of Hepworth, Ontario, are members, which has secured the patent rights of this process for the Dominion of Canada. It is proposed to erect factories at central points for the manufacture of this material, and the construction of works therewith.

The Dominion Radiator Co. recently gave a most enjoyable picnic at St. Catharines to their employees.

The Dominion Architectural Metal Works Co., Montreal, has applied for incorporation with a capital stock of $8,000.

The Dennis Wire and Iron Co. of London Ont., have issued a neat catalogue and price list of the many kinds of wrought iron goods which they manufacture.

Mr. R. O. Munro, formerly of the Canada Paint Co., Montreal, has recently been appointed general manager of the British America Paint Co., Victoria, B. C.

The Shawinigan Falls Brick Mfg., Co., Shawinigan Falls, Que,, has applied for incorporation with a capital stock of $25,000, to manufacture bricks, drain-pipes, cement, etc.

What is claimed to be the largent marl deposit in the Dominion of Canada for the manufacture of Portland cement has been discovered by Thos. M. Rowan in the vicinity of Orangeville. It comprises, 400 acres, the depth of marl, being from 6 to 30 feet. There are also 200 acres of clay, of an average depth of 6 to 10 feet. This material has been manufactured into cement and found to be an exceptionally high grade. The property is within two and a half miles of a shipping point.

VISIT OF THE CLEVELAND BUILDERS' EXCHANGE.

WHILE the Industrial Exhibition was in progess the members of the Cleveland Builders' Exchange accompanied by members of their families paid a visit to Toronto. They were met on arrival by the officers of the Toronto Exchange, shown the sights of interest in the city, including the Exhibition, and entertained at a banquet at McConkey's. Mr. H. Martin, President of the Toronto Exchange, presided and tulfilled the duties of toastmaster. The visitors were also entertained by the Board of Directors of the Exhibition, and all in all, spent a very enjoyable time.

The Architectural Annual, a book of 200 pages, in cloth binding, printed on heavy paper, is published under the auspices of the Architectural League of America, and edited by Albert Kelsey, former president of the Philadelphia T Square Club. The book is dedicated to the Young Man of Ambition, whether architect or draughtsman. It aims to be a resume of architectural history for the year. It comprises original articles on many subjects relating to architecture and municipal art, sketches of prominent architects and sculptors, with illustrations of their work, extracts from papers and addresses presented before various societies, etc. The book is sold by subscription only, at $3.50 per copy, and may be obtained from the publishers, 931 Chestnut street, Philadelphia.

METHODS OF ESTIMATING THE COST OF BUILDINGS.

There are five methods of ascertaining the value of buildings before erection, writes Mr. John T. Rea, F.S.I., in the Architectural Record. Four of these deal with approximate estimates, and are chiefly used by architects; the remaining one is the more exact method of precise quantities, and is the business of the quantity surveyor. These methods are:—

I. Estimating by the Cost per Cubic Foot of Similar Buildings.—This is the best known and most usually adopted method, because of its general convenience. The dimensions are best taken by measuring the length and breadth from out to out of walls, and the height from half foundations to half way up the roof. The cubic contents thus obtained are multiplied by the price per foot cube of some similar building. Sometimes the height is measured from the bottom of footings (i.e., top of concrete) to half way up the roof. Cheaper attached structures, such as annexes, stables, sheds, &c., should be kept separate and priced at a lower rate; while more ornamental portions, like towers and porches, should be valued higher than the main block. Small buildings cost more in proportion than large ones of the same type.

This cubing system is open to some objections. The lumping together of voids and solids at one rate is certainly unscientific, for the same class of building may be divided into many rooms with numerous internal solids in the shape of walls, &c., between; while another may have comparatively few chambers, creating much empty space. In fact, the proportion of voids to the solid structure is not a fixed quantity, so that the price per cubic foot can never be exactly regulated. This requires large experience and a nicety in pricing which the estimator cannot always possess. The description and quality of materials and workmanship, too, are seldom the same; neither are the conditions of contract; and these variations are frequently overlooked when a certain rate per cube foot is assumed. Owing to these imperfections the following methods are better:—

II. Taking out Rough Quantities and Pricing the Items.—This method is described in Leaning's "Quantity Surveying," and in "A Price-Book for Approximate Estimates," by T. E. Coleman, F.S.I., surveyor, Royal Engineer Establishment. The work should be concentrated into as few items as possible in order to save labor, and a schedule of prices or old bills of quantities would be necessary to price these out. Though less expeditious, this is a more reliable system than pricing at per cubic foot.

III. Estimating per Square.—This method has been recommended by Professor Kerr in his "English Gentleman's House," and by Mr. Webber in his "Choice of a Dwelling," published in 1872. It has, however, been reserved for Mr. Alcock, F.S.I., surveyor, R. E. Establishment, to develop and fully describe this system in an article contributed to the "Occasional Papers of the Association of Surveyors of H.M. Service, July, 1894." The mode is to take the constructional shell only, pricing it at so much per 100 square feet. Walls, for instance, are taken according to their thickness and manner of finishing, including all digging, concrete, plastering, papering, &c.; floors including joists, struttings, ceilings, &c.; roofs including slating, lead work, rafters, boarding, &c.; and so on—all being reckoned at per square complete. Such a system of superficial measurement appears to be more satisfactory than the cubing, as it takes into account the materials and labor in a more exact and definite form. Of course a special list of prices must be compiled for each of these main superficies, and care and discrimination are certainly required.

IV. Pricing per Unit of Accommodation.—This is a somewhat rough and ready means of estimating the cost of such buildings as hospitals, schools, churches, stables, which may be respectively priced at per patient, per scholar, per sitting, and per horse. It is better, however, to check an approximate estimate by working out two or more styles, thereby ensuring closer results.

V. Estimating by Accurate Quantities.—For full information on this head the reader is referred to such well-known books as Leaning's "Quantity Surveying" and Fletcher's "Quantities." This method is only adopted when it is intended to actually carry out the work, and usually when tenders are sent in by several builders in competition. It is very laborious, and necessitates great skill and a thorough knowledge of building construction, so that the subject is invariably left to quantity surveyors as experts. The system is divided into the three parts of "taking off," "abstracting," and "billing," the last only being forwarded to the contractors for the purpose of inserting their prices, when the completed bills are sent to the architect for his and his client's decision. The whole procedure is, of course, familiar to every reader of this paper.

CANADIAN BUILDING STONES AT PARIS.

The London Builder contains the following reference to the exhibit of Canadian building stones at the Paris Exhibition: "Canada exhibits many varieties of building and ornamental stones. Amongst them we noticed a granite from Spoon Island, Queen's County, New Brunswick, which is similar in appearance to our Newry granite, having a bluegrey background, in which small irregular-shaped crystals of orthoclase felspar abound. Another granite, like ourc Sotch grey Dalbeattie stone, comes from Jarvis Inlet, Nelson Island, British Columbia. A third is like red Peterhead granite, minus smoky quartz. A fourth, of Laurentian age, from Gonansque, resembles the well known deep red, medium grained granite from Sweden. There are several kinds of light green and gray sandstones from different parts of the Dominion, and a deep red sandstone, recalling the stone from Corsehill Dumfries. A good assortment of marbles also forms part of this collection which has been made under Government auspices. The cities of Montreal, Quebec, and Ottawa are chiefly constructed of limestones from the Trenton formation. The grey fine-grained granites of Quebec are raised in the eastern part of the Province; but many others equally good yet remain to be exploited from the Laurention formation. The same horizon furnishes excellent crystolline limestones, pure, or mixed with serpentine, forming beautiful white and greenish marbles. In the eastern part of Quebec, at New Rockland for example, there are large slate quarries, and the material compares very favorably with the best Welsh slate. Most of these stones are represented in the Canada building."

A tinge of blue in white striping color on black increases the strength.

SANITATION OF THE INTERIOR OF DWELLING HOUSES.

The sanitation of the interior of dwelling houses where the house drains and service pipes are directly connected with the sewer, as commonly practised in France, was the subject of a report presented by M. M. Lacau, architect (vice-president of the Sanitary Engineers and Architects of France), and L. Masson (Engineer of the Sanitation Works of the Seine), and also another report, from the English point of view, presented by Mr. Roechling, sanitary engineer (Leicester), at the recent International Congress of Hygiene at Paris. The main feature of the French report was the rejection of the disconnecting trap from the system of domestic drainage in favor of direct connection of the whole system with the public sewer, and the use of the house pipes as ventilators for the sewers. It was stated that the disconnecting device was introduced into English methods in consequence of defects in the sewers in England, which permitted of the formation of foul accumulations which emitted sewer gas that would be dangerous if admitted into a house. The effectiveness of the disconnecting trap for the purpose of keeping out of the house dangerous gases was denied by the French report, the denial being based upon the results of experiments made some years ago by the Sanitary Institute. According to this report the experiments of the Sanitary Institute proved that from 20 to 60 per cent. of fœcal matters were left in the traps after flushing, only from 40 to 80 per cent. of the solid matters contained in w.c. waste finding its way into the public sewer. M. M. Lacau and Masson therefore recommended the suppression of disconnectlng traps and demand that in all cases the house drains and pipes should be directly connected with the sewers, the only precaution necessary being to carry above the roof a pipe with which the whole system of pipes should be connected so as to form a ventilation conduit for both the sewer and the house drains. The chief of the eight conclusions set out in the report is the 7th, which ran thus: The conduits (canalisation) of a house comprise the waste pipes, rain pipes, and house drain which connects them to the sewer. This drain, laid with the utmost fall available, is directly connected with the public sewer without the intervention of a syphon (trap). The rain pipes connected with the system are prolonged above the roof to ensure the ventilation of the whole system.

The eighth conclusion specially concerns the plumber. It runs thus: 8. The plumbing work both for the waste water drawn off from the closets, the supply of potable or other water, and for the interior of the house ought to be the object of especial care. The plumbing arrangements ought to be such that the service of water pipes, (joints, branches, etc.), as well as the hydraulic apparatus (tanks, flushing apparatus, basins, syphons, traps, etc.), the rain pipes and waste pipes, shall be completely protected from frost.

In the long discussion that followed (after the report of Mr. Roechling had also been read) strong objection was taken by Mr. Roechling, Mr. A. Smith and Mons. Symons (engineer), delegate from Holland, to the statements made with regard to the disconnecting system as generally practised in England. Mr. Roechling denied that the sewers in England (except in certain of the older parts of London where they were not so good as might be wished) were defective. The modern sewers (the majority) were as good as they could be made, and were as well if not better managed than in other countries. Unjustifiable deductions had been drawn from the accounts published of the experiments made by the Sanitary Institute. It had been stated in the paper that 50 per cent. of the solid matters remained in the intercepting trap, but it had not been stated that the position of the w. c. with which they had been made was equivalent to that of a w. c. placed in the cellar. If in England we lived in houses of five or six stories, containing from 60 to 100 persons each, with an allowance of 60 gallons of water per day, the flush would be so great that nothing at all would be left in the trap. It would be more just to cite the experiments of the Sanitary Institute as an argument in favor of the use of disconnecting traps rather than against it.

The report of Mr. Roechling, a resume of whicl. was subsequently read by the author in French, presented the following conclusions, which, after a brief consideration were passed over without any resolution being taken on them:

1. The end and object of the systematic drainage of a house is to endow it with a good system of water supply and discharge for waste water.

2. The object will be the most certainly attained where the following essential rules are strictly observed: (a) To exclude from the interior of our houses all sewer gas, to avoid pollution of the soil by fœcal matter or waste water, to prevent the generation of deleterious gases in the soil and in the air below and around our houses; (b) to discharge as rapidly and completely as possible into the public sewer all fœcal matter and waste water produced.

3. The application of these two essential rules necessitates (a) an intercepting trap; (b) a disconnecting trap for the exclusion of gas; (c) a trap for the interception of solid matters other than those from the water closet; (d) a proper system of ventilation; (e) a flushing tank for each water-closet; (f) pipes that are air-tight and water-tight; (g) the employment of proper materials for the pipes; (h) proper dimensions and thicknesses for all pipes; (i) sufficient fall to ensure automatic cleansing; (j) junctions with very obtuse angles; (k) proper construction of water closets, baths and other sanitary appliances; (l) facility of access to all pipes for inspection and testing; (m) sufficient flush for all closets and baths; (n) periodical visitation and cleansing when necessary.

The Sun Portland Cement Co., Owen Sound, Ont., has been incorporated with a capital stock of $500,000, to manufacture Portland cement, whiting, lime, etc. The provisional directors include J. G. Hay, G. A. Ross, of Owen Sound, and John Fleet, of Toronto.

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AGENTS FOR CANADA

PERPENDICULAR BRICKSCALE,

APPLICABLE TO ALL FACE WORK IN CANADA.

FOR ARCHITECTS, BUILDERS AND STONE CUTTERS.

Copyright, 1900, by D. A. Hewitt, Toronto, Canada.

Pile 4 bricks dry (an average of the make used) and measure the height, then decide the amount of mortar for joints. The sum of the quantities will be the gauge, and indicate which column to use.

Number of Perpendicular Courses.	Pressed Brick. 1st Column. Feet.	Inches.	Fractions.	2nd Column. Feet.	Inches.	Fractions.	3rd Column. Feet.	Inches.	Fractions.	Common Brick. 4th Column. Feet.	Inches.	Fractions.	5th Column. Feet.	Inches.	Fractions.	6th Column. Feet.	Inches.	Fractions.	Number of Perpendicular Courses.
1		3	5-8		2	11-16		2	3-4		2	7-8		2	15-16			7-8	1
2		5	1-4		3	3-8		2	1-2		3	3-4		3	7-8		1	3-4	2
3		7	7-8		4	1-16		3	1-4		4	5-8		4	13-16		1	1-2	3
4		10	1-2		5	3-4		4			5	1-2		5	3-4		2		4
5	1	1	1-8	1	1	7-16	1	1	3-4	1	2	3-8	1	2	11-16	1	2	7-8	5
6	1	3	3-4	1	2	1-8	1	2	1-4	1	3	1-4	1	3	5-8	1	3	1-4	6
7	1	6	3-8	1	3	13-16	1	3	1-4	1	4	1-8	1	4	9-16	1	4	1-8	7
8	1	9		1	5	1-2	1	4		1	5		1	6	1-2	1	5		8
9	1	11	5-8	2	0	3-16	2	0	3-4	1	7	7-8	2	1	7-16	2	0	3-4	9
10	2	2	1-4	2	2	7-8	2	2	1-4	2	0	3-4	2	3	5-8	2	2	1-4	10
11	2	4	7-8	2	5	9-16	2	3	1-4	2	2	5-8	2	4	5-16	2	3	1-4	11
12	2	7	1-2	2	8	1-4	2	5		2	5	1-2	2	6	1-4	2	4		12
13	2	10	1-8	2	10	15-16	2	11	3-4	2	7	3-8	2	7	3-16	2	5	3-16	13
14	3	0	3-4	3	1	3-8	3	1	1-4	3	0	1-4	3	0	1-8	2	6	1-16	14
15	3	3	3-8	3	4	5-8	3	4	1-4	3	2	7-8	3	3	1-16	2	7		15
16	3	6		3	7		3	5		3	5	1-2	3	4		2	8	1-16	16
17	3	8	5-8	3	9	11-16	3	10	3-4	4	0	7-8	4	1	15-16	3	9	1-16	17
18	3	11	1-4	4	0	3-8	4	1	1-4	4	1	3-4	4	2	7-8	3	10		18
19	4	1	7-8	4	3	1-16	4	4	1-4	4	2	5-8	4	3	13-16	3	11	1-16	19
20	4	4	1-2	4	5	3-4	4	7		4	3	1-2	4	4	3-4	4	0		20
21	4	7	1-8	4	8	7-16	4	9	3-4	4	4	3-8	4	5	11-16	4	1	3-16	21
22	4	9	3-4	4	11	1-8	5	0	1-4	4	5	1-2	4	6	5-8	4	2	1-4	22
23	5	0	3-8	5	1	13-16	5	1	1-4	4	6	1-8	4	7	9-16	4	3	1-4	23
24	5	3		5	4	1-2	5	2		4	7		4	8	1-2	4	4		24
25	5	5	5-8	5	7	3-16	5	8	3-4	4	8	7-8	4	9	7-16	4	5	3-16	25
26	5	8	1-4	5	9	7-8	5	11	1-4	4	9	3-4	4	10	3-8	4	6	1-8	26
27	5	10	7-8	6	0	9-16	6	2	1-4	4	10	7-8	4	11	5-16	4	6		27
28	6	1	1-2	6	3	1-4	6	5		5	0	1-2	5	0	1-4	4	7	1-16	28
29	6	4	1-8	6	6	15-16	6	7	3-4	5	1	3-8	5	1	3-16	4	8	1-8	29
30	6	6	3-4	6	8	5-8	6	10	1-2	5	2	1-4	5	2	1-8	4	9		30
31	6	9	3-8	6	11	5-16	7	1	1-4	5	3	1-8	5	3	1-16	4	9	1-16	31
	Pressed Brick.									Common Brick.									

EXPLANATION—The dark face type on the sides of columns indicate the number of perpendicular brick courses; the six columns between, the calculated results to suit the different gauges.

It is a quick determination of courses, feet, inches or fractions without any tedious figuring.

The sizes vary to suit the requirements of any given problem.

USUAL SIZES OF BRICK.

Red or Brown Pressed Brick—8½" × 4½" × 2½".
Trojan or Buff Pressed Brick—8½" × 4⅜" × 2⅜".
Common Brick.....8⅜" × 4⅛" × 2⅛".

HORIZONTAL BRICKSCALE

OF THE FACE-WORK

Giving in length the number of bricks laid in a wall or in piers.

For the use of Architects, Builders and Stonecutters.

Copyright, 1900, by D. A. Hewitt, Toronto, Can.

	Pressed Brick. Red or Brown, 8½ × 4½ × 2½. ½" Mortar Joint. Feet.	Inches.	Fractions.	Red or Brown, 8½ × 4½ × 2½. ¾" Mortar Joint. Feet.	Inches.	Fractions.	Trojan or Buff, 8½ × 4⅜ × 2⅜. ½" Mortar Joint. Feet.	Inches.	Fractions.	Trojan or Buff, 8½ × 4⅜ × 2⅜. ¾" Mortar Joint. Feet.	Inches.	Fractions.	Common Brick. 8⅜ × 4⅛ × 2⅛. ½" Mortar Joint. Feet.	Inches.	Fractions.
1 Brick + 1 Joint.		8	9-16		9	5-8		8	11-16		8	3-4		9	1-4
1½ Bricks + 1 Joint.	1	0	11-16	1	0	3-4	1	0	13-16	1	0	7-8	1	1	3-8
2 Bricks + 1 Joint.	1	4	15-16	1	5		1	5	3-16	1	5	1-4	1	6	1-8
2½ Bricks + 2 Joints.	1	9	1-16	1	9	1-8	1	9	1-2	1	9	5-8	1	10	5-8
3 Bricks + 2 Joints.	2	1	1-2	2	1	5-8	2	1	7-8	2	2		2	3	3-8
3½ Bricks + 3 Joints.	2	5	13-16	2	6		2	6	3-16	2	6	3-8	2	7	7-8
4 Bricks + 3 Joints.	3	10	1-16	2	10	1-4	2	10	9-16	2	10	3-4	3	0	5-8
4 Bricks + 4 Joints.	3	1	3-8	3	2	5-8	3	2	7-8	3	3	1-8	3	5	1-8
5 Bricks + 4 Joints.	3	6	5-8	3	6	7-8	3	7	1-4	3	7	1-2	3	9	7-8
5½ Bricks + 5 Joints.	3	10	15-16	3	11	1-4	3	11	9-16	3	11	7-8	4	2	3-8
6 Bricks + 5 Joints.	4	3	3-16	4	3	1-4	4	3	13-16	4	4	1-4	4	7	1-8
6½ Bricks + 6 Joints.	4	7	1-2	4	7	7-8	4	8	1-4	4	8	5-8	4	11	5-8
7 Bricks + 6 Joints.	4	11	3-4	5	0	1-8	5	0	5-8	5	1		5	4	3-8
7 Bricks + 7 Joints.	5	4	1-16	5	4	1-2	5	4	15-16	5	5	3-8	5	8	7-8
8 Bricks + 7 Joints.	5	8	5-16	5	5	3-4	5	9	5-16	5	9	3-4	6	1	5-8
8½ Bricks + 8 Joints.	6	0	5-8	6	1	1-8	6	1	5-8	6	2	1-8	6	6	1-8
9 Bricks + 8 Joints.	6	4	7-8	6	5	3-8	6	6		6	6	1-2	6	10	7-8
9½ Bricks + 9 Joints.	6	9	3-16	6	9	3-4	6	10	5-16	6	10	7-8	7	3	3-8
10 Bricks + 9 Joints.	7	1	7-16	7	2		7	2	11-16	7	3	1-4	7	8	1-8
	Pressed Brick.												Common Brick.		

EXPLANATION—To ascertain the measurement of a horizontal length of a brick wall or pier on the bed (including mortar joints), select a column according to the quality of work desired.

It is a quick determination of bricks, feet, inches and fractions, without any tedious figuring.

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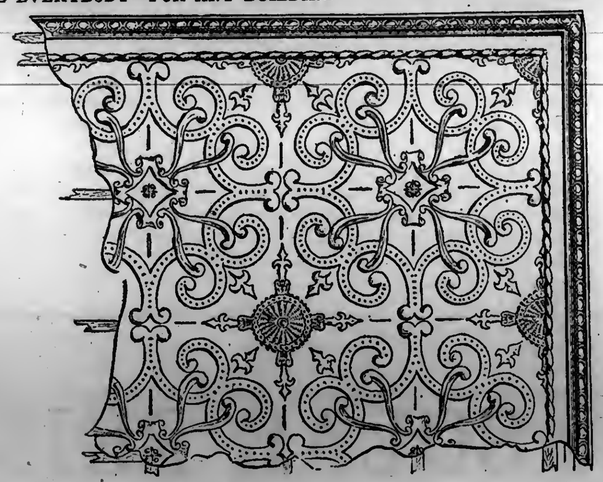

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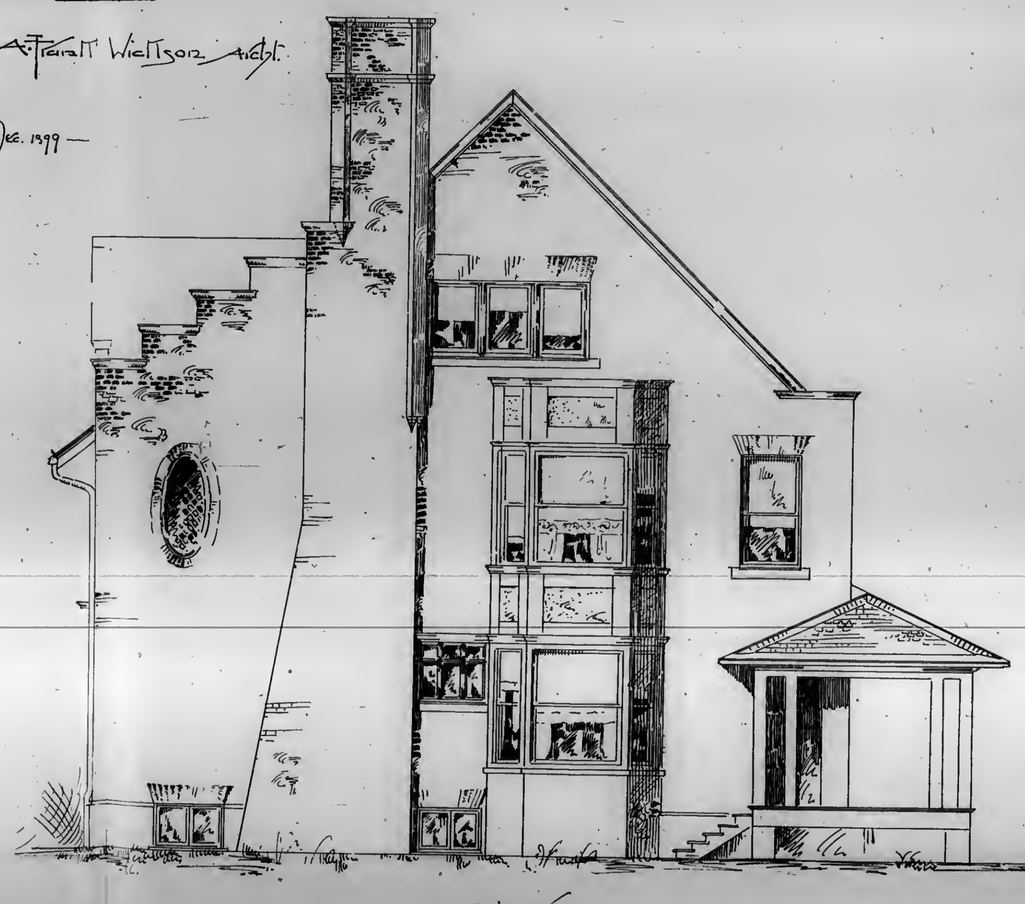
—Dec. 1899—

—Front Elevation—



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VOL. XIII.—NO. 10. OCTOBER, 1900 { PRICE 20 CENTS $2.00 PER YEAR.

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A Monthly Journal of Modern Constructive Methods.

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Tower Fire Escapes For Schools.

THE Board of Education of Philadelphia recently resolved by a unanimous vote that all new school buildings shall be provided with stone, brick or iron tower fire escapes. Tower escapes are adjudged to be in every way superior to the old style outside fire escape, and can be used in connection with the fire drill.

Building In Toronto.

There has been no falling off in volume of building operations in Toronto, in comparison with 1899, notwithstanding the increased cost of materials, although no doubt the rise in prices of the tatter was the means of retarding many enterprises which otherwise might have gone forward. At the close of the half year the value of permits granted was greater than for the like period of 1899. The population of the city has considerably increased during the year. Vacant houses have in consequence filled up rapidly, and there is now a great scarcity of houses at a moderate rental. Rents of houses of this class have advanced about twenty-five per cent. It would appear that an era of house building must shortly begin. Let us hope that the opportunity thus offered for improvement in design and construction will not be lost, even upon the speculative builder. The fact should be borne in mind by every person who puts up a building that it is possible at little or no extra cost above that of the most commonplace structure to use materials in a manner that shall secure a pleasing result, and not violate the canons of good taste. How many ugly buildings do we see in which the best and most costly materials have been employed, but without knowledge or skill? What a constant waste there is of money and

material in this manner. Not only so, but our streets are made to exhibit architectural monstrosities which constantly offend the perception of educated beholders, and prove stumbling blocks in the path of progress of those whose artistic faculties are in process of cultivation.

Burning Damaged Cement.

MR. R. W. EGERTON, Executive Engineer of the Northwestern Railway, describes the results of reburning cement which had been damaged by floods during the progress of the Khojak Tunnel. To this purpose a furnace was employed which had been used for heating trough sleepers before reshaping them, the fuel used being dust coal. The damaged cement, which in most cases was found to be set solid to the centre, was taken out of the barrels, broken into pieces which would pass through a 3" ring, placed in the furnace, and the firing kept up day and night. After burning and cooling the cement was ground in a steam mortar mill and screened in a revolving screen of 1600 mesh. The material so treated was found to heat when slaked it used fresh, but this tendency disappeared after air slaking 15 or 20 days. The results of tests showed the material to have an average strength of nearly 200 lbs. after a period of slightly more than 2 months, or about one-third of the original strength. The re-burning was done at a sufficiently low cost to make the expenditure profitable, and the re-burned cement mixed with three parts of sands to one of cement, gave excellent results.

Roof Coverings.

SHINGLED roofs have recently come into favor for dwellings in Toronto. While less durable, they are said to be cooler in summer and warmer in winter than slate. A shingle roof is also less liable to injury from wind and settlement of the building. Perhaps its most important recommendation, however, in the eyes of the architect is the possibilities it offers for color effects. The monotony of black slate roofs has long been a cause of dissatisfaction with architects. Many of the new shingle roofs are stained, while others have been left to the softening influences of the weather. In the majority of instances where a stain has been employed, the entire roof is made uniform in tone—usually some shade of green. Now and then the attempt has been made to use a variety of shades, but as a rule the effect has not been satisfactory, the gradations of tone not being sufficiently gradual. Some architects have successfully adopted the method of mixing their own shingle stains. By this plan they claim to have been able to secure any desired color, as well as any number of tones of a particular color, being thereby enabled to obtain satisfactory graduated effects. This method is also preferred on the ground of cheapness.

The Financial Aspect of Rapid Building.

MR. Gilbert Cass, in an article in the New York Record and Guide, supplies data showing the wonderful rapidity with which modern tall buildings are constructed in that city. As an example, he takes the Broadway Chambers, a structure 50x95 feet and 18 stories high, which was contracted for on March 1st, 1899, and completed on May 1st of the present year. The site had to be cleared of old buildings, neighboring buildings and streets supported, foundations put in and materials prepared and assembled. Mr. Cass shows that the great value of the land upon which these structures are erected renders such rapid construction necessary. Assuming, he says, that the value of the land upon which the building is to be erected is placed at $1,500,000, the interest thereon at 4 per cent. is $60,000. If two years are consumed in construction of the new building, it will have cost in interest $120,000, to say nothing of the loss of rental of the old building." Therefore, owners naturally hesitate about putting up structures of this character unless the work can be completed within a year. The writer referred to states that in order to accomplish such rapid construction, drawings must be prepared considerably in advance, and the contracts should be let at least two months before the work is to be begun. This gives the contractor the required opportunity to get the structural steel and other material under way in the shops.

Legislation Affecting Workmen and Contractors.

IMPORTANT legislation has recently been enacted by the Dominion Parliament affecting the rights of workmen and contractors engaged on public contracts. In July last the House of Commons adopted the following Resolution: "That it be Resolved, That all government contracts should contain such conditions as will prevent abuses which may arise from the sub-letting of such contracts, and that every effort should be made to secure the payment of such wages as are generally accepted as current in each trade for competent workmen in the district where the work is carried out, and that this House cordially concurs in such policy, and deem it the duty of the government to take immediate steps to give effect thereto. It is hereby declared that the work to which the foregoing policy shall apply includes not only work undertaken by the government itself, but also all works aided by grant of Dominion public funds. That it is not expedient to mix with this proposal the salaries of those employed in the public departments of the government." In pursuance of this resolution a number of new conditions have been embodied in government contracts since that date, the principal points of which are, that a contractor shall not assign or sublet his contract; that all workmen employed upon government contracts shall be residents of Canada, unless Canadian labor is not available, or unless there should be special circumstances which would render it contrary to public interest to enforce the condition. Workmen must be paid in accordance with the Fair Wages Schedule prepared by the government, the hours of labor and the rate of wages to be such as generally obtain in the locality in which the work is to be done; the contractor must furnish to the Minister of Labor a statement showing names of workmen, rate of wages, amounts paid and unpaid for work done, this statement to be attested by a statutory declaration; a similar statement is to be furnished with regard to the materials purchased for use on the contract; the Minister of Labor is given the right to reserve and pay over to the workman or the persons supplying materials out of the moneys due the contractor, any unpaid amounts which may be due them, no portion of the work is to be done by piece-work.

An officer has been appointed to collect data from various parts of the Dominion relating to the existing scale of wages in each locality and the rate of wages to be paid on each individual contract is specified by this official. The fixing by the government of the rate of wages to be paid workmen should be of some advantage to contractors, and will at least tend to equalize to a greater degree than heretofore bids for public works. Another effect of the measure will be the employment by contractors for works of this character of only the most rapid and skilled class of workmen. Whether or not this will result in raising the standard of workmanship will depend to some extent upon the amount of employment afforded by government works.

In connection with the newly established Department of Labor there will be published an official journal called the Labor Gazette in which will be printed statistics, copies of legislation, reports of legal cases affecting the interests and rights of workmen, etc. Several correspondents have been appointed to report to the department the rates of wages and labor conditions in various centres of population. The first number of this publication contains a complete list up to the end of August of all contracts let by the Department of Public Works since the adoption of the Fair Wages Schedule. In connection with this list the schedule of wages to be paid by the contractors on these contracts is also given; such information should be of value to the contractor as well as to the workman.

In addition to the legislation above referred to there has been put on the Statute Books a Conciliatory Act which provides for the appointment of a conciliator by application of either of the parties to a dispute, the appointment of an arbitrator on application of both of the parties, and under certain conditions a commissioner or commissioners to hold an enquiry under oath where, for the better settlement of the disputes, such course is deemed desirable. This Act, which is based on similar legislation previously in force in Great Britain, Australia and elsewhere, provides the machinery whereby disputes between employer and workmen may be adjusted, and is designed to reduce the number of strikes. It is, however, a purely voluntary measure, inasmuch as the Dominion Parliament has not the power to pass a compulsory measure. This power, affecting civil rights, resides in the Provincial Legislatures.

Uniform Contract.

THERE appears to be need for the adoption by Canadian architects and builders of a standard form of contract. Enquiry shows that there are at present in use many different forms—as many perhaps as a dozen in the city of Toronto alone—while various forms are also in use in the other cities and towns of the Dominion. Many architects, especially the younger members of the profession, seem to prefer to use special forms of their own. The desire to maintain friendly relations with the architects and the keenness of competition, has induced contractors to sign contracts, the terms of which they did not always regard as being entirely just and satisfactory. Some 15 years ago a form of contract was agreed upon between the architects and builders of Toronto which was found to be equitable and was generally used for many years. Gradually, however, by reason of changing circumstances new forms were introduced, and the number has steadily increased. The time seems to have come when an effort should be made to draft a standard form of contract which should conserve the rights of all parties concerned, and which would be likely to come into general use throughout the Dominion.

HOT WATER VS. STEAM HEATING.

OCCASIONALLY one meets with a person who is an ardent advocate of steam heating for dwelling houses, and one or two instances come to mind in which the advocates of steam have shown their faith in the system by installing it in their houses. Enquiry shows, however, that steam heating for dwellings is not generally popular and is not increasing in favor. The demand for the hot water system on the contrary, is constantly increasing, and this fact alone is the best evidence of its greater suitability for house heating.

Fifteen years ago steam and hot air were exclusively used for heating houses where furnaces were employed. One of the largest manufacturers of hot water apparatus sought to at that period introduce the hot water system into the eastern States and met with great difficulties. The steam-fitters who had become familiar with the installation of steam heating apparatus knew nothing about hot water plant, and apparently did not wish to take the trouble to learn. At first none of them could be induced to put in a hot water system, but the manufacturers were determined that the system should be introduced, and upon obtaining an order, sent their own men to put in the apparatus. In this way the steam-fitters were gradually forced to give attention to the new method and undertake the work of installation.

To-day the great majority of houses of the better class are heated by hot water, and no steam-fitter is presumed to understand his business who cannot install a hot water system. There are many advantages connected with the hot water system as compared with steam heating. It is, in the first place, more economical, much less fuel being required than where steam is used. The regulation can be adjusted to suit climatic conditions, while with steam the same degree of heat is maintained at all times. With hot water the heat is retained by the water for some time after the fire has been extinguished. With steam the radiators cease to give out heat immediately that the temperature in the boiler falls below 212 degrees, and in starting up the system this temperature must be reached before any heat is available, while with hot water when the temperature reaches 35 or 40 degrees, radiation of heat commences. There is also with hot water heating the advantage of greater humidity of air as compared with either steam or hot air. The value of this greater moisture in the air to the health of the occupants of dwellings need scarcely be dwelt upon.

While steam heating is not well adapted for dwellings, it is undoubtedly superior to hot water or any other method for public buildings where some of the rooms may at times be vacant. Hot water would be liable to freeze in the pipes in such rooms. It is also, as stated by Mr. Robert King in the paper published in the last number of this journal, best adapted for large greenhouses, as the heat can be forced more rapidly through long stretches of pipe, while with the spraying apparatus, which is a necessity in all large greenhouses, the required humidity in the air can easily be supplied.

Plain English and plain type, well put together, have made more fortunes than all things else combined.—Press and Printer.

BY THE WAY.

THE management of the celebrated Carnegie Public Library at Pittsburg, Pa., the design of which was selected by competition a few years ago, proposes to remove the building to another site 4,000 feet distant, with the object of preserving its appearance from injury from changes which are now taking place around it. The building is 150 x 400 feet in size, having a skeleton of steel cased with stone. Its estimated weight is 58,000 pounds. Means must be found of transporting it across a ravine 200 feet wide and 100 feet deep.

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THE somewhat surprising statement is made that it is the intention of the Pennsylvania Railway Company to supersede the iron bridge across the Susquehanna river at Rockville, near Harrisburg, by one of masonry. The structure about to be removed consists of twenty-three spans of about 160 feet each. The masonry bridge will have forty-eight spans of 70 feet each, and including piers and approaches the total length will be 3,820 feet, or nearly three-quarters of a mile. Masonry is considered to have advantages over steel in endurance and economy of repairs.

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IN Montreal and several of the the smaller cities and towns organizations of public spirited citizens have been formed to promote and protect the interests of the residents and property owners. These organizations will make suggestions with regard to the manner of carrying out public improvements, and exert an influence in behalf of the selection of a proper class of men to compose the municipal council. The latest town to join this movement is North Toronto, and I observe that in the fore front of the movement is Mr. W. R. Gregg, the Registrar of the Ontario Association of Architects.

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THE relative merits of the various methods of heating were under discussion, when a well-known Toronto steam fitter told how he once lost an important contract. He had submitted a tender for installing a steam heating plant in a court house in a certain town in Ontario, and in common with other bidders, was asked to attend a meeting of the council for the purpose of fully explaining his system. At the conclusion of his remarks, the representative of a firm of manufacturers of hot air apparatus got up and addressed the assembled councillors, the majority of whom were farmers, somewhat as follows: "Gentlemen,—you all know what happens when a steam thresher explodes or gets in too close contact with the barn. How would you like to sit here knowing that beneath you was a steam boiler liable to explode at any moment?" In vain the steam fitter explained that no damage could occur from a boiler operating with but five pounds pressure—the hot air man's ruse succeeded, and he was given the contract. The apparatus which he installed has since been replaced by steam.

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THE locality in which the town of Midland, Ont., is situated abounds in springs of water. So strong is the flow from these springs, that by placing a small water wheel in his cellar the proprietor of one of the hotels forces the water into an elevated tank, from which it is drawn as required through pipes and taps. The device has been in successful operation for a number of years. It is proposed to construct next year a water works system which will be supplied from springs situated about a mile distant from the town. Midland is said to be very prosperous, there being at present under construction about 275 dwellings, ranging in cost as high as $15,000.

THE OCTAGON.

THE American Institute of Architects opened rooms last year as headquarters in Octagon House, Eighteenth street and New York avenue, Washington, D. C. The secretary, Mr. Glen Brown, here preserves all literature which is received in exchange for the Institute's Proceedings and in other ways, and classifies it in the most careful manner. The Institute now receives publications from more than forty-three foreign societies, forty American societies and institutions, and fifty-nine publications on architecture and allied subjects.

A card catalogue is kept, and a quarterly bulletin is issued by the Institute, in which is given an index of all publications received and another index of the literature contained in them classified under subject headings, as, for instance, acoustics, banks, biographical, brickwork, cement, colonial, construction, French school, etc. This bulletin is sent to the Ontario Association of Architects, and will be kept in the new rooms, 96 King street west, Toronto, and will be found valuable for reference.

Mr. S. Okamato, an architect from Tokio, Japan, lately called at the Octagon, and left a gift of one hundred sets of drawings of tea houses made with a brush with as true and neatly drawn lines as if done by a pen. These drawings are folded on a plan so that when the sides, partitions, &c., are raised a paper model is formed showing both exterior and interior of the house. Mr. Okamato says that the Society of Japanese Architects has sixty full members who are educated in the modern sense, and over 700 sub-members forming a distinct class, and including anyone connected with buildings, contractors, uneducated architects, superintendents and foremen.

W. R. GREGG, Registrar O.A.A.

A resolution recently passed by the Dominion Trades Council recites the fact that a great cause of disease is insanitary plumbing, and favors application to the various governments for legislation to compel all municipalities using water works and sewerage systems to appoint a permanent plumbing inspector. There are yet a number of cities in Canada which have no plumbing inspector. These should be compelled to appoint one. In the case of towns the expense would be too great, unless there could be combined with the position other duties.

LEGAL.

Mr. J. W. Siddall, architect of the St. Lawrence market improvements, Toronto, has entered an action for slander against alderman Sheppard, a member of the Board of Control of the City Council claiming $10,000 damages.

BROWN vs. EAGER.—Judgment by the Court of Appeal at Toronto on appeal by defendant Eager from judgment of Falconbridge, J., in favor of plantiff in action to recover from defendant Fillion $2,158.44 (and interest) alleged to have been advanced to him by plaintiffs in connection with a contract dated July 23, 1896, for the construction by Fillion of four dams on the river Otonabee, between Nassau and Lakefield, as part of the construction work of the Trent canal extension. The plaintiffs were the original contractors with the Government, and they alleged that defendant Eager was a partner in the contract with Filion by reason of subsequent agreement between Filion and him after Filion had failed to keep his contract, and so liable, and, if not a partner, that the money was advanced by plaintiff to Filion at Eager's request and for his use. The trial judge held that defendants were not partners, but that defendant Eager had made himself liable by his conduct, particularly by his letter of December 7, 1897, requesting plaintiffs to pay for provisions and supplies for Filion's camp and his telegrams of December 17, 1897, requesting them to advance the amount necessary to carry on the work, and to pay back wages, if necessary. Held, that defendant Eager was liable to plaintiffs for such moneys as they, on the authority of his letter and telegram, may have properly advanced or paid to or for Filion in respect of the contract, but whether the moneys claimed in this action are payments and advances properly chargeable to Eager under such a letter and telegram must be dealt with by the Master upon the reference directed. Appeal dismissed with costs.

A CASE UNDER THE WORKMEN'S COMPENSATION FOR INJURIES ACT.—The following particulars are given in vol. 31, page 521, of the Ontario Law Reports for the current year, relating to a workman, who, while employed by contractors in the erection of a building, sustained injuries by falling a distance of 30 feet to the ground through the giving way of part of the scaffolding on which he was working. He claimed damages for negligence in the construction of the scaffolding. The scaffold on which he was standing consisted of a single plank, 16 feet long, one end of which rested on a trestle, and the other on a stay formed of a plank nailed to two upright posts forming part of the main building. The stay, as originally fastened to the posts, was perfectly secure, as the plank forming the stay was 2 inches thick and rested on its edge on a cleat securely fastened to the posts by spikes; the stay itself being also securely fastened to the posts by large spikes. The whole evidence showed that the stay, while in that condition, was capable of sustaining a great weight. The general superintendent of the contractors' works was explicit in giving directions to the workmen, from time to time, that the stays should be put up and secured as these stays were. The day before the accident, the stay in question was removed by two of the workmen, for their own convenience, while working a windlass, and raised about a foot above the cleats and nailed to the posts. This rendered the stay dangerous, because it was fastened at one end with two or three nails, and at the other end (upon which the plank forming the scaffold was placed) by only one nail. On the day of the accident the plaintiff (the carpenter) and a fellow workman, were directed by the foreman on this work to cut off the ends of two beams at the top of the third story, and the plank referred to was thrown across from the trestle to the stay, a distance of 12 feet. The carpenter and his companion mounted this plank, which was over an open hatchway, when the stay gave way, and the carpenter fell down through the hatchway and so received the injuries for which the action was brought. In answer to written questions put to them by the judge, the jury found:—(1) that the defendant (the contractors' foreman) did not direct the two workmen to remove the stay; (2) that replacing the stay caused it to be defective; (3) that the defect was not discovered through the neglect of the contractors' foreman; (4) that the foreman placed the plank across between the two beams to form the scaffold; (5) that the foreman, through his own negligence, was not aware that the stay was defective. The jury assessed the damages at $500. The trial judge reserved judgment on these answers, and subsequently dismissed the action with costs. He held that the jury having found that the foreman did not direct the two workmen to remove the stay, there was no evidence to support the finding of the jury that the defect was not discovered through the negligence of the foreman. The foreman, he said, had no reason to suppose that any change had been made in the stay. On returning with their answers the jury were asked by the judge what was the negligence imputed to the foreman. They replied: 'The plank would be higher at one end than the other, and he could easily see facing that.' As to this the court makes the following comments: 'The foreman having a right to assume that the stay had not been tampered with by the workmen, and that it was in the condition of security in which it was placed under his directions, and when it was in the same condition up to 3 o'clock the previous day, there was nothing in the mere difference in the height of the two ends of the plank to indicate that there had been a change. The difference caused no comment on the part of the plaintiff who was present and saw the plank placed in position, and who mounted on it to commence work. If it could be held that there was negligence on the part of the foreman upon the facts disclosed here, it would cast a responsibility on employers never contemplated by the Act.' (1900), Ontario Reports, vol. 31, page 521.

STANDING DRAWING BOARD.

The following description of a standing drawing board is contributed to the American Machinist by Mr. Baxter Alakson. He says that he is well pleased with it. The board is 6 ft. by 4 ft., and when standing at an angle of 30 degrees from a vertical plane the lower edge is 24 inches from the floor. The straightedge is carried by two drums. These drums are keyed 5-16 in. shaft running the full length of the board. At midway of the shaft is another drum of the same diameter, which is wrapped in the opposite direction, and to which is attached the counterweight which balances the straigtedge. The carrier cords are of braided linen, are simply laced to the straightedge. Each of the little holes shown at the ends of the straigtedge has in it a brass bushing, rounded at the ends, to make the cord run through easily. At each end of the straightedge is a cleat 3⅛ in. thick, lapping the ends of the board, to prevent any side movement.

METHOD OF DIFFUSING LIGHT.

As an experiment in trying to obtain a uniformly distributed light throughout the rooms of the new engineering building of the University of Wiscousin, the auditorium and drawing rooms will be lighted by electricity with the lamps so placed as to be invisible to persons in the rooms. They will be arranged around the sides of the rooms with opaque reflectors to project the light evenly over dead white ceilings. These ceilings will reflect the light throughout the rooms, thus furnishing a reflected light of uniform intensity everywhere in the rooms. Prof. J. B. Johnson, Dean of the College of Engineering, of the University of Wisconsin, says it is not known that this method of illumination is now in use anywhere in America, but the professors in the electrical department of the College of Engineering affirm that it can be readily done.

ON the morning of September 25th, the Works of the Caledonian Portland Cement Co. at Marlbank, Ont., were destroyed by fire, with the exception of the kiln house. Spontaneous combustion of coal gas is given as the cause. The fire appliances are said to have been very inadequate. The loss is placed at $60,000. The capacity of the works was 500 barrels per day. The Managing Director, Mr. F. G. B. Allan of Deseronto, states that the works will be immediately rebuilt, and in a more substantial manner.

THE new Immigrant Station on Ellis Island, New York Harbor, has stone roofs, each serving as a balcony floor, designed by Messrs. Boring and Tilton, architects. These are of thick slate slabs, supported on steel beams, according to the Engineering Record. The slabs were selected sound and uniform in color, 1½ inches thick, and dressed smooth on both sides. On each beam galvanized iron double gutters are fixed along each side of top flange, to catch any leakage at the joints, which are filled with slater's cement. The slabs are clamped to the top flanges of the beams by steel clips, having bolts set with plaster of Paris in holes drilled in the slate. These metal clips are 1½ in. by 3/16 in., and are 18 in. apart. The roof is pitched to the front edge, where it drains into a copper gutter on wrought iron brackets, with one side flashed up over the blocks which raise the slabs from top of the beams to clear the joint gutters.

STANDARD SPECIFICATIONS FOR STEEL AND IRON.*

SPECIFICATIONS FOR STEEL FOR BRIDGES AND SHIPS.

1. Steel shall be made by the open-hearth process.

2. Each of the three classes of structural steel for bridges and ships shall conform to the following limits in chemical composition :

	Steel made by the Acid Process. per cent.	Steel made by the Acid Process. per cent.
Phosphorus shall not exceed....	0.08	0.06
Sulphur shall not exceed.....	0.06	0.06

3. There shall be three classes of structural steel for bridges and ships, namely, rivet steel, soft steel and medium steel, which shall conform to the following physical qualities :

4. Tensile tests :

Tensile strength, pounds per square inch 50,000 to 60,000 rivet steel; 52,000 to 62,000 soft steel, 60,000 to 70,000 medium steel.

Yield point in pounds square inch shall not be less than 30,000 rivet steel, 32,000 soft steel, 35,000 medium steel.

Elongation in per cent. 8 inches shall not be less than 26 rivet steel, 25 soft steel, 22 medium steel.

5. For material less than 5-16 inch and more than ¾ inch in thickness, the following modifications shall be made in the requirements for elongation :

(a) For each increase of ⅛ inch in thickness above ¾ inch, a deduction of 1 per cent. shall be made from the specified elongation.

(b) For each decrease of 1-16 inch in thickness below 5-16 inch, a deduction of 2½ per cent. shall be made from the specified elongation.

(c) For pins made from any of the three classes of steel the required elongation shall be 5 per cent. less than that specified in paragraph 4, as determined on a test specimen the centre of which shall be 1 inch from the surface.

6. Eye bars shall be of medium steel. Full size tests shall show 12½ per cent. elongation in 15 feet of the body of the eye-bar, and the tensile strength shall not be less than 55,000 lbs. per square inch. Eye-bars shall be required to break in the body, but should an eye-bar break in the head, and show 12½ per cent. elongation in 15 feet and the tensile strength specified, it shall not be cause for rejection, provided that not more than one-third of the total number of eye-bars tested break in the head.

7. The three classes of structural steel for bridges and ships shall conform to the following bending tests, and for this purpose the test specimen shall be 1½ inch wide, if possible, and for all material ¾ inch or less in thickness the test specimen shall be of the same thickness as that of the finished material from which it is cut, but for material more than ¾ inch thick the bending test specimen may be ½ inch thick.

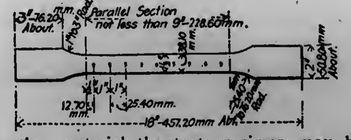
Rivet rounds shall be tested of full size as rolled.

(d) Rivet steel shall bend cold 180 degs. flat on itself without fracture on the outside of the bent portion.

(e) Soft steel shall bend cold 180 degs. flat on itself without fracture on the outside of the bent portion.

(f) Medium steel shall bend cold 180 degs. around a diameter equal to the thickness of the specimen tested, without fracture on the outside of the bent portion.

8. The standard test specimen of 8 inch gauged length shall be used to determine the physical properties specified in paragraphs Nos. 4 and 5. The standard shape of the best specimen for sheared plates shall be as shown by the following sketch :



For other material the test specimen may be the same as for sheared plates, or it may be planed or turned parallel throughout its entire length and in all cases where possible, two opposite sides of the test specimens shall be the rolled surfaces. Rivet rounds and small rolled bars shall be tested of full size as rolled.

(9) On the tensile test specimen shall be taken from the finished material of each smelt, but in case this develops flaws or breaks outside of the middle third of its gauged length, it may be discarded and another test specimen substituted therefor.

10. One test specimen for bending shall be taken from the finished material of each melt as it comes from the rolls, and for material ¾ inch and less in thickness this specimen shall have the natural rolled surface on two opposite sides. The bending test specimen shall be 1½ inch wide if possible, and for material more than ¾ inch thick the bending test specimen may be ½ inch thick.

(g) The bending test may be made by pressure or by blows.

11. Material which is to be used without annealing or further treatment shall be tested for tensile strength in the condition in which it comes from the rolls. For material which is to be annealed or otherwise treated before use, a full-size section of tensile test specimen length shall be similarly treated before cutting the tensile test specimen therefrom.

12. For the purpose of this specification, the yield point shall be determined by the careful observation of the drop of the beam or halt in the gauge of the testing machine.

13. In order to determine if the material conforms to the chemical limitations prescribed in paragraph No. 2 herein, analysis shall be made of drillings taken from a small test ingot.

14. The variation in cross section or weight of more than 2½ per cent. from that specified will be sufficient cause for rejection, except in the case of sheared plates, which will be covered by the following permissible variations :

(h) Plates 12½ lbs. per square foot or heavier, when ordered to weight, shall not average more than 2½ per cent. variation above or 2½ per cent. below the theoretical weight.

(i) Plates under 12½ lbs. per square foot, when ordered to weight, shall not average a greater variation than the following :

Up to 75 inches wide, 2½ per cent. above or 2½ per cent below the theoretical weight ; 75 inches and over, 5 per cent. above or 5 per cent. below the theoretical weight.

(j) For all plates ordered to gauge there will be permitted an average excess of weight over that corresponding to the dimensions on the order equal in amount to that specified in the following table :

TABLE OF ALLOWANCES FOR OVERWEIGHT FOR RECTANGULAR PLATES WHEN ORDERED TO GAUGE. THE WEIGHT OF ONE CUBIC INCH OF ROLLED STEEL IS ASSUMED TO BE 0.2833 LBS PLATES ¼ INCH AND OVER IN THICKNESS.

Thickness of Plate. Inch.	Width of Plate. Up to 75 Inches. Per cent.	75 to 100 Inches. Per cent.	Over 100 Inches. Per cent
¼	10	14	18
5/16	8	12	16
⅜	7	10	13
7/16	6	8	10
½	5	7	9
9/16	4½	6½	8½
⅝	4	6	8
Over ⅝	3½	5	6½

PLATES UNDER ¼ INCH IN THICKNESS.

Thickness of Plate. Inch.	Width of Plate Up to 50 inches. Per cent.	50 inches and Above. Per cent.
⅛ up to 5/32	10	15
5/32 up to 3/16	8½	12½
3/16 up to ¼	7	10

15. Finished material must be free from injurious seams, flaws or cracks, and have a workmanlike finish.

16. Every finished piece of steel shall be stamped with the melt number, and steel for pins shall have the melt number stamped on the ends. Rivets and lacing steel, and small pieces for pin-plates and stiffeners, may be shipped in bundles, securely wired together, with the melt number on a metal tag attached.

17. The inspector representing the purchaser shall have all reasonable facilities afforded to him by the manufacturer to satisfy him that the finished material is furnished in accordance with these specifications.

* Recommended by a Special Committee of the American Institute Civil Engineers.

All tests and inspections shall be made at the place of manufacture prior to shipment.

SPECIFICATIONS FOR STRUCTURAL STEEL FOR BUILDINGS.

The only marked deviations from the specifications for bridge and ship steel are in the following clauses and in permission to use Bessemer as well as open-hearth steel:

2 Each of the two classes of structural steel for buildingsshall not contain more than 0.10 per cent. of phosphorus.

3 There shall be two classes of structural steel for buildings, namely, rivet steel and medium steel, which shall conform to the following physical qualities :

4. Tensile tests.

	Rivet Steel.	Medium Steel.
Tensile strength, pounds per square inch	50,000 to 60,000	60,000 to 70,000
Yield point, in pounds per sq. in. shall not be less than	30,000	35,000
Elongation, per cent. in 8 ins. shall not be less than	26	22

SPECIFICATIONS FOR WROUGHT-IRON.

1. Wrought-iron shall be made by the puddling process or rolled from lagots or piles made up from No. 1 wrought-iron scrap, alone or with muck bar added, it being understood that test iron Class B and stay-bolt iron contain no scrap.

2. The minimum physical qualities required in the four classes of wrought-iron shall be as follows :—

	Refined Iron.	Test Iron Class A.	Test Iron Class B.	Stay-Bolt Iron.
Tensile strength, lbs. per sq. in.	48,000	48,000	50,000	46,000
Yield point, lbs. per sq. in.	25,000	25,000	25,000	25,000
Elongation, per cent. in 8 ins.	15	20	25	28

3. In sections weighing less than 0·654 lb. per lineal foot the percentage of elongation required in the four classes specified in paragraph No. 2 shall be 11·25 per cent., 15·00 per cent, 18·75 per cent., and 21·00 per cent. respectively.

4. The four classes of iron when nicked and tested as described in paragraph No. 9 shall show the following fracture :—

(a) Refined iron, a generally fibrous fracture, free from coarse crystalline spots. Not over 15 per cent. of the fractured surface shall be granular.

(b) Test iron class A, a generally fibrous fracture, free from coarse crystalline spots. Not over 10 per cent. of the fractured surface shall be granular.

(c) Test iron class B, a long, clean, silky fibre, free from slag or dirt or any coarse, crystalline spots. A few fine crystalline spots may be tolerated provided they do not in the aggregate exceed 10 per cent. of the sectional area of the bar.

(d) Stay-bolt iron, a long, clean, silky fibre, free from slag or dirt, and wholly fibrous, being practically free from crystalline spots.

5. The four classes of iron when tested as described in paragraph No. 10 shall conform to the following bending tests :—

(e) Refined iron shall bend cold 180 degs. around a diameter equal to twice the thickness of the tested specimen, without fracture on outside of the bent portion.

(f) Test iron class A, shall bend cold 180 degs. around a diameter equal to the thickness of the tested specimen, without fracture on outside of the bent portion.

(g) Test iron class B, shall bend cold 180 degs. flat on itself without fracture on outside of the bent portion.

(h) Stay-bolt iron, a piece of stay-bolt iron about 24 inches long shall bend in the middle through 180 degs. flat on itself, and then bend in the middle through 180 degs. flat on itself in a plane at a right angle to the former direction, without a fracture on outside of the bent portions. Another specimen with a thread cut over the entire length shall stand this double bending without showing deep cracks in the threads.

6. The four classes of iron, when tested as described in paragraph No. 11, shall conform to the following hot-bending tests :—

(i) Refined iron shall bend sharply to a right angle, without showing cracks or flaws.

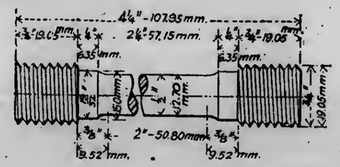
(j) Test iron class A, shall bend through 180 degs. flat on itself, without showing cracks or flaws.

(k) Test iron class B, shall bend through 180 degs. flat on itself, without showing cracks or flaws. A similar specimen heated to a yellow heat and suddenly quenched in water between 80 degs. and 90 degs. F. shall bend without hammering on the bend, 180 degs. flat on itself without showing cracks or flaws. A similar specimen heated to a bright red heat shall be split at the end and each part bent back through an angle of 180 degs. It will also be punched and expanded by drifts until a round hole is formed whose diameter is not less than nine-tenths of the diameter of the rod or width of the bar. Any extension of the original split or indications of fracture, cracks or flaws developed by the above tests will be sufficient cause for the rejection of the lot represented by that rod or bar.

(l) Stay-bolt iron shall bend through 180 degs. flat on itself, without showing cracks or flaws. A similar specimen heated to a yellow heat and suddenly quenched in water between 80 and 90 degs. F. shall bend, without hammering on the bend, 180 degs. flat on itself, without showing cracks or flaws.

7. Stay-bolt iron shall permit of the cutting of a clean, sharp thread, and be rolled true to gauges desired so as not to jamb in the threading dies.

8. Whenever possible, iron shall be tested in full size as rolled to determine the physical qualities specified in paragraphs Nos. 2 and 3, the elongation being measured on an 8-inch gauged length. In flats and shapes too large to test as rolled, the standard test specimen 1½ inch wide and 8 inches gauged length. In large rounds the standard test specimen of 2 inches gauged length shall be used ; the centre of this specimen shall be half-way between the centre and outside of the round.



9. Nicking tests shall be made on specimens cut from the iron as rolled. The specimen shall be slightly and evenly nicked on one side, and bent back at this point through an angle of 180 deg. by a succession of light blows. Tested iron class B and stay-bolt iron may be nicked approximately 20 per cent. of its thickness.

10. Cold bending tests shall be made on specimens cut from the bar as rolled. The specimen shall be bent through an angle of 180 deg. by pressure or by a succession of light blows.

11. Hot bending tests shall be made on specimens cut from the bar as rolled. The specimens, heated to a bright red heat, shall be bent through an angle of 180 deg. by pressure or by a succession of light blows, and without hammering directly on the bend.

If desired a similar bar of any of the four classes of iron shall be worked and welded in the ordinary manner without showing signs of red shortness.

12. The yield point specified in paragraph No. 2 shall be determined by the careful observation of the drop of the beam or halt in the gauge of the testing machine.

13. All wrought iron must be practically straight, smooth, free from cinder spots or injurious flaws, buckles, blisters or cracks. As the thickness of bars approaches the maximum that the rolls will produce the same perfection of finish will not be required as in thinner ones.

In flat and square bars 1-32 inch variation either way from the size ordered will be allowed.

In round iron 0·01 inch variation either way from the size ordered will be allowed, except in stay-bolt iron, which shall be at least 0·01 inch, and not more than 0·025 inch below normal size, to insure freedom from jambing in the threading dies.

INSPECTION.

14. This clause, for inspection, is the same as for bridge steel.

THE STRENGTH OF TIMBER, AND HOW TO TEST IT.

I PROPOSE to discuss in this paper the determination of the chief mechanical properties of timber. I shall deal with the methods best adapted for obtaining their numerical values, and also the actual results obtained in the most modern experiments.

You will find scattered through the older text books, the proceedings of various societies, and in other works an immense mass of experimental results of mechanical tests of various kinds of timbers, including all the timbers used in constructional work. Unfortunately, many of these figures are not very reliable, and if used in any calculations require to be used with the utmost circumspection and caution. There are three reasons for this statement :—

(a) The tests were in almost every case carried out on specimens of very small sizes, and often it is quite clear that the specimens were selected with great care, so as to insure straightness of fibres and freedom from all knots and other blemishes; they were thus by no means fairly representative of the average quality of the particular timber experimented on.

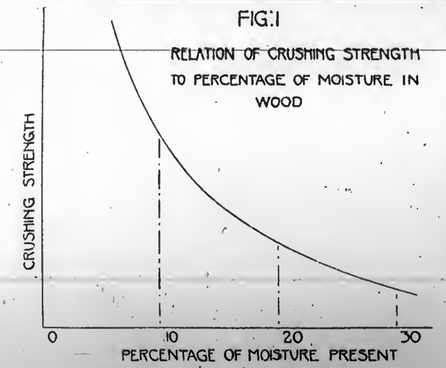
(b) From the unfortunately very loose way in which various timbers are named on the market, it is sometimes impossible to know now what the timber was which was tested.

(c) In no case, as far as I know, were any observations made to determine the amount of moisture in the timber at the time of the test, in most cases not even the time of seasoning was given, nor time of felling, &c. Now as will be seen shortly the moisture condition is a vital factor in determining the mechanical properties of timber.

The first tests in which careful observations were made both as to moisture condition, and previous history of the timber were those made by the late Professor Bauschinger at Munich in 1883 and 1887, the results being published in "Mitthilungen aus dem Mechanisch-Technischen Laboratorium der K. Technischen Hochschule in Munchen," 1883 and 1887. He investigated very fully the influence of moisture on the strength both as regards crushing and cross bending. His first method of determining the dryness of his specimens was to dry sawdust or chips from his specimens in a current of dry, warm air at a temperature of 214 deg. Fahr. for about eight hours, and to determine the loss of weight by careful weighings before and after drying. The difference of weight shown by the two weighings divided by the dry weight gives the percentage of moisture present in the sample. He afterward adopted the plan of drying the whole tested specimen at the above temperature in an oven from two to four days, determining the loss as before by weighings. He eventually selected 15 per cent. as a standard of moisture to which all results should be reduced. (Timber in a dry, well-warmed house has probably about 10 per cent. of moisture.)

The law expressing the relation of strength to moisture present in the specimen was readily determined by making tests on several specimens cut from the same stick of timber, the specimens being of different degrees of dryness. Plotting the strengths to a base of moisture percentage gave a curve of the form shown in fig. 1.

FIG. 1



The equation to this curve gives the law expressing how the strength increased with increase of dryness. Making use of this law, the result at different moisture conditions can be reduced to the standard dryness of 15 per cent. for that particular class of wood.

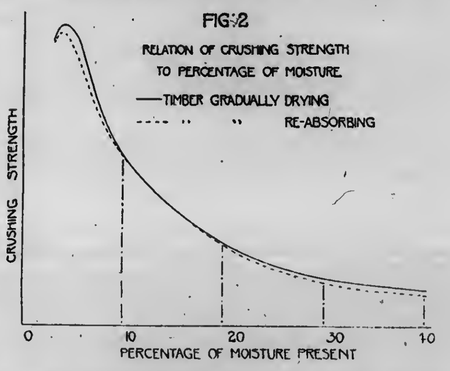
The next great series of tests were made on behalf of the Forest Department of the Board of Agriculture of the United States from 1891-1895. The experiments were made as to the mechanical tests by Professor Johnson, while all timbers were examined carefully as to their cellular structure, at Washington. Over 300 trees were cut down and experimented with, embracing ten different kinds of pine or needle leaf (soft woods) and five different kinds of broad leaf trees (hard woods) all United States timber trees.

Very careful observations were made as to the condition of the soil and climate where they were grown, the age and size of trees, and conditions of growth, time of felling, &c.

As in Bauschinger's tests, to whom entirely belongs the credit of establishing a rational system of timber testing, very careful determinations were made of the moisture conditions of the tested bars. For this purpose, they adopted the plan of cutting a thin disc across the whole of the section of the stick as close to the fracture point as possible. These were at once weighed and again weighed after drying for a sufficiently long period in a current of warm, dry air, temperature 220 deg. Fah. As in Bauschinger's experiments, it was again found that the moisture condition was a vital one in determining the mechanical properties.

Johnson's crushing tests of similar material with different degrees of dryness, as shown by fig. 2, seems to show that the greatest strength is reached not when the wood is absolutely dry, but with some 3 per cent. or 4 per cent. of moisture. It is somewhat difficult to ascertain this with perfect accuracy as absolutely dry wood re-absorbs moisture so rapidly from the air; it is however not a point of practical importance as such dryness condition as 3 per cent. is never found in actual practice.

FIG. 2



Another point, however, of much greater practical importance brought out by these tests was that re-absorbed moisture has the same effect in weakening the timber as the original sap. This is shown by the two curves in fig. 2, one being a series of tests of material undergoing a steady increase of dryness, the other of material with its moisture being steadily increased by absorption.

This, of course, is of importance in such cases as timber in use underground in damp situations where no means are taken to prevent the absorption of the water. He found as a general rule that the strength with 12 per cent. moisture was, with all species, 75 per cent. greater than when "green."

The form of these curves for variation of strength with variation of moisture indicates clearly enough that increase of moisture beyond a certain amount has little effect, the reason being that we are then merely filling the cells themselves with water; and similarly, when drying, the curve begins rapidly to steepen when the walls themselves begin to dry; this occurs in the case of pines at about 33 per cent. moisture.

Another question investigated in these tests which we may deal with here was whether or not "bleeding" or tapping for turpentine, the "pitch pine" had any harmful effect upon its mechanical properties. (It has been freely stated that it did, as well as on its durability.) The experiments showed, as a result of over 1,300 separate tests, no such result; the mechanical properties were apparently not in any way injured. An investigation was also made as to effect of rapid seasoning, and here, again, no injurious effects

From a lecture delivered by Professor Hudson Beare at Carpenters' Hall, London, and reprinted from The Herald.

were produced by this process as usually carried out with currents of hot air.

We will now deal in succession with the different kinds of tests made to determine the mechanical properties of timber, giving a few typical results in each case.

TENSION EXPERIMENTS.

Tension experiments are very difficult to carry out owing to the fact that the specimens so frequently give way by shear, drawing out the part held in the shackles.

The form of specimen usually adopted is shown in fig. 3, with the dimensions.

The results of different experiments vary very much, partly from the above cause, and partly because the specimens being of necessity small, the great influences of original differences in quality

FIG. 3

are more important. The tenacity, however, appears to be relatively very great, especially when one considers the porous nature of timber.

Professor Lanza, who failed to get satisfactory results with his big tension tests, says, "tie bars in construction will always give way in some other manner than by direct tearing, for instance, by tearing out the fastenings by shearing and splitting the timber."

Again, in the long series of tests of American timber made by Professor Johnson for the United States Government they decided to abandon tension experiments because "it was thought timber would never fail in pure tension in practice."

Bauschinger found that the elastic limit in tension practically coincided with the breaking point; while, apparently, the influence of time of felling soon disappeared. The figures given below are taken from Bauschinger's first paper, and show the great difference of strength in tension between the living sap wood and the dead heart wood. The figures are the mean of eight tests for the sap wood and four tests for the heart wood in each case, and they show also the influence of time of feelling, which, however, as stated before, appears to disappear after a long seasoning :—

COMPARISON OF STRENGTH OF HEART WOOD AND SAP WOOD IN TENSION, AND OF SUMMER AND WINTER FELLING.

Tenacity in lbs. per sq. inch.

	Summer felled.		Winter felled.	
	Sap Wood.	Heart Wood.	Sap Wood.	Heart Wood.
Red Pine	14,940	3,270	10,660	4,120
Spruce..	13,790	4,413	17,620	4,905

COMPRESSION.

Fortunately it is much easier to carry out crushing tests, easier to make our specimens, and easier to get concordant results. Enormous numbers of tests have been made at various times; but I will only deal with the more modern ones, in which the condition of the timber as to moisture, &c.—to which I have already drawn attention—has been noted.

Bauschinger concluded that when the average quality of a timber was under determination—as, for example, when investigating the effect of time of felling—then pressure tests were the best. He advises cutting a disc from each end and from the centre of the log, then dividing each of these into four sections, and from each of these cutting a square prism of length about one and a half times its side. These should be crushed if possible, at a standard dryness of 15 per cent., and their density determined by weighing and measuring.

Bauschinger found for pine woods that the strengths of short columns when plotted to a base of densities gives a straight line that is the crushing strength is a function of the density.

The figures below are Bauschinger's results for the crushing strength per square inch reduced to 10 per cent. dryness for the same quality of timber as the tension figures just given:—

SUMMER FELLED.

Red Pine.....5,310 lbs. per square inch.
Spruce.....4,770 " " " "

WINTER FELLED.

Red Pine.....7,167 lbs. per square inch.
Spruce.....5,600 " " " "

In Lanza's tests a large number of poats 7 in. and 10 in. diameter, mostly 12 feet long, were crushed; all gave way by pure compression. A summary of the results obtained are given below :—

	Max.	Min.	Mean.	
Yellow Pine	4,720	3,920	4,370	lbs. sq. in.
Old and seasoned white oak	5,197	3,965	4,480	" " "

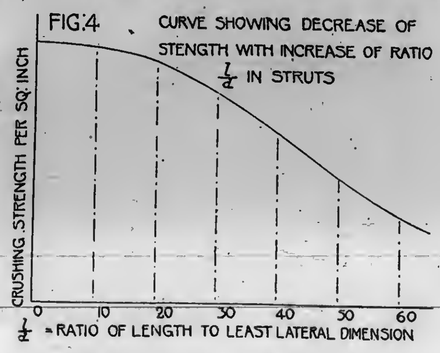
Another big series was made on the Watertown machine in the United States of America on struts of considerable length. These show markedly the same condition of affairs as with long struts of iron and steel—namely, an enormous reduction of strength with increase of ratio of least diameter to length. These Watertown tests were apparently on green timbers, but the data is not known.

In several cases three pieces were bolted and keyed together to act as one, but in no case did they show a greater strength per square inch (they were all 15 ft. long) than single pieces, though they ought, according to the ordinary formula for the strength of columns, as they had their least dimension increased—in fact, they buckled out in the same plane as the single one.

Fig. 4 shows the relation of crushing strength to length of column, or rather to ratio $\frac{l}{d}$ for yellow pine.

Johnson in his compression tests, cut off pieces 8 in. long from 4-in square sticks, the ends of the long sticks which had been tested as beams. He noted that after the shearing in of one end, which is the way the timber strut usually gives way, its strength is only 80 per cent. of the original strength. He also concludes

FIG. 4 CURVE SHOWING DECREASE OF STENGTH WITH INCREASE OF RATIO $\frac{l}{d}$ IN STRUTS



from his experiments that this is the easiest and most valuable of all tests. He advises a factor of safety of 8 for dry, and 5 for green timber when used in compression.

All the crushing I have been discussing so far is that applied endwise and with the grain. Now, it frequently happens in practice that a piece of vertical timber stands upon a horizontal piece, thus transmitting a load to it; it becomes, therefore, very important to determine the crushing strength across the grain. Not many experiments have been made. Tredgold found that 1,000 lbs, was sufficient to indent Memel fir distinctly, and 1,400 lbs. English oak.

It is, of course, rather a matter of judgment to decide what is the crushing load, i. e., what indentation we must take as the limit; some authorities give $\frac{1}{10}$ in. Johnson takes 3 per cent. compression as a working limit, or $\frac{3}{16}$ in. in a foot-thick bar, and 15 per cent. as destructive = $1\frac{3}{4}$ in. in a 12-in.-thick bar. He experimented with specimens 2 in. and 4 in. thick, and found a value in the case of pines on an average of 1,400 lbs. per square inch as against 7,000 lb. with the grain, or only $\frac{1}{5}$. With American oaks the figures were respectively 2,300 lbs. per square inch, and 7,500 lbs. per square inch, or about $\frac{1}{3}$.

These figures prove the extreme importance of paying attention to this point in designing any structure or temporary timber erection.

CROSS BENDING.

This is a very favorite form of test, partly because very large pieces with big spans can be readily tested without requiring very big loads; in fact, it is a test which can be readily carried out on a job with but little trouble or expense. Two knife edges or supports, a cradle to carry weights, and some pig or other lumps of iron for weights, are all that are needed, while a stretched cord and a 2-foot rule readily enable the strains or deflections to be measured. I will again describe only a few of the more modern experiments.

Bauschinger made a large number of tests on beams 7½ in. by 7½ in. by 98 in. span. The table gives some of his figures for the quality of timber for which the previous figures have been given:—

	Modulus of Elasticity, lbs. sq. in.	Limits of Elasticity. lbs. sq. in.	Breaking Stress. lbs. sq. in.	Density.	Moisture. per cent.
Red Pine.					
Summer..	1,535,000	2,867	6,720	0·50	23
Winter...	1,465,000	3,136	6,405	0·55	33
Spruce.					
Summer..	1,563,000	3,247	5,957	0·45	29
Winter...	1,670,000	3,719	6,406	0·45	27

Lanza's tests in general support Bauschinger's conclusions. His beams were 2 in. to 6 in. thick, 2 in. to 12 in. deep, span, 4 ft. to 20 ft.

It is, perhaps, well to point out here that the calculated stresses in the outer fibres deduced from the ordinary formula for beams is only the real stress in the case where the load does not exceed the elastic limit; beyond that the formulæ does not hold. The figures we obtain, therefore, for the stress from the observed value of the load in the centre at rupture, are not stresses but mere numbers, useful, however, as comparative figures. Lanza's results are given in the table below:—

CROSS BREAKING STRESS PER SQUARE INCH IN LBS.

Material.	Max.	Min.	Mean.	Mean Modulus of Elasticity.
Spruce.....	8,756	2,994	4,883	1,330,000
Yellow Pine.....	11,360	3,962	7,289	1,744,000
Oak.....	7,660	4,985	6,074	1,292,000
White Pine.....	7,250	3,437	4,807	1,080,000

JOHNSON'S TESTS.—Most of his beams were 4 in. square, and tested on a 6 ft. span; in these cases the rate of loading was arranged so as to produce deflection at the rate of ⅛-in. per minute. Tests were also made on full-sized logs; in this case the rate of loading was arranged to give ¼-in deflection per minute. The following is a table of Johnson's results for all kinds of tests of four typical timbers:—

	Sp. gr.	Weight per c.f.	Cross breaking stress per sq. in			Crushing stress per sq. in. in lbs.		Shear stress in lbs. per sq. in.
			Limit of Elasticity.	Final load	Modulus of Elasticity.	Endwise	Across.	
Long Leaf Pine.....	0.61	38 lbs.	10,000	17,600	2,070,000	8,000	1,260	835
Red Pine.....	0.50	31 "	7,700	9,100	1,920,000	6,700	1,200	800
White Oak.....	0.80	50 "	9,600	13,100	2,090,000	8,500	2,200	1,000
White Elm.....	0.54	34 "	7,300	11,360	1,540,000	6,300	1,200	800

All the figures are reduced to 12 per cent. moisture.

To give you an idea of the variation in such tests, in red pine, with 100 tests the highest crushing strength was 8,200 lbs. per square inch; lowest, 4,300 pounds; 54 per cent. were within 10 per cent. of mean, and 96 per cent. within 25 per cent. In cross-breaking the highest figure was 12,900 lbs., lowest 3,100 lbs.; 28 per cent. came within 10 per cent., and 60 per cent. within 25 per cent. In these tests only absolutely bad stuff was rejected in testing; no attempt was made to pick specimens.

Johnson has shown by cutting up his large sticks into smaller ones that under conditions of moisture of the same character little sticks have the same strength as big ones. Only the temptation to pick out specially good small samples is usually too great to allow such tests to be fair averages.

One general result of Bauschinger's tests, verified also by Johnson, was that the strength is much affected by the ratio of summer (solid) to spring (open) growth in each annual ring, or in other words, that the specific gravity is the determining factor. He also showed that there was a definite relation between the modulus of elasticity (determined from bending tests) and the values obtained for crushing and bending strengths—it varied directly with them. Johnson similarly found that for all timbers dealt with in his experiments (except in the case of oak, which from its complex cellular structure seems an exception) the strength rises steadily with density, i.e., with increase of specific gravity.

SHEAR.

In many beam tests, the beams actually give way by shear along the neutral axis. In Lanza's tests eleven beams gave way like this, the shear stress per square inch at the neutral plane being:—Spruce, 191 lbs. per square inch; yellow pine, 248 lbs. per square inch, which was also about the shear stress in this plane in the case of those which actually tore fairly across, so apparently they may in the case of soft woods give way in either fashion.

Direct shear tests are not numerous. The Watertown results were higher than above, namely, for yellow pine, 286 to 415 lbs. per square inch; and for spruce, 253 to 374 lbs. per square inch. Johnson's results for the shear were somewhat higher. These are accounted for by the fact that a special shear test fixes the shear at a particular section, while in the beam it selects the weakest plane near neutral axis.

I must now say a few words on the influence of time on the ultimate strength. I always find in bending tests and crushing tests that when a certain load is reached the material will go on steadily yielding, i.e., the strain goes on increasing, and no doubt rupture would occur at loads less than the final one, if only we left the load on long enough.

Professor Thurston made a striking series of tests on this question; nine bars 1 in. square in section carried on 40-in. supports were tested, the centre breaking load (on a similar bar on same span) rapidly applied being 375 lbs., and the deflection 1·8 in. On three bars a load of 350 lbs. was hung from the centre of the beam and left continuously on; on another three the load was 300 lbs., and on the last three the load was 250 lbs. All nine of the bars eventually broke in half under these loads.

The three with 350 lbs. all broke in less than forty-three hours, deflection 2.3 in.

The three with 300 lbs. all broke in from eighty to 719 hours, deflection 3·0 in.

The three with 250 pounds all broke in from 6,000 to 11,000 hours (=250 to 460 days), deflection 2·5 in.

Hence 60 per cent. of the final load produced rupture when kept on long enough.

In conclusion, I would say that in most cases where much timber is to be used, it is better and safer to make fresh tests of the actual stuff to be used rather than to rely upon old figures.

If cross bending tests of measurements are made of the deflections for gradually increasing loads, and if the results are plotted in the ordinary way as stress-strain curves, then the curves show that the timber has no true elastic limit, but that up to a certain load the relation between load and deflection is pretty constant. It is probable that if this load is not exceeded rupture would not occur, no matter how long the load was left upon the beam.

PERSONAL.

Mr. James Scott Webster, contractor, of Galt, was married on September 27th to Miss Annie Johnston, of that town.

Mr. G. A. Reid, President of the Ontario Society of Artists, has completed an attractive new residence and studio on Indian Road, near High Park, Toronto.

Mr. Wm. Grove, whose father, Mr. David Grove, is one of the largest contractors in Berlin, Germany, and the agent for the Dominion Radiator Co., of Toronto, recently visited Toronto, and inspected many of the public buildings of that city. Mr. Grove's firm installed the heating and ventilating system in the new Parliament Buildings in Berlin at a cost of about a quarter of a million dollars. Comparison shows that in Germany the standard of prices for work of this character is higher than in Canada. Mr. Grove states that hot water heating is steadily growing in favor in Germany.

Messrs. Toro Iwamura, a professor and lecturer in the Tokio Academy of Fine Arts, and Akaira Sano, an architect in the employ of the Japanese government, recently visited Toronto and inspected the public buildings of that city with the object of gaining information to be employed in the erection of a colossal new palace for the Crown Prince. It is estimated that fifteen years will be occupied in its construction. These gentlemen have been commissioned by the Government of Japan to visit all the capitals of Europe. They state that the government does not give great encouragement to foreign art, being desirous of preserving the old Japanese examples.

Branch Office of the CANADIAN ARCHITECT AND BUILDER,
Imperial Building.

OCTOBER 12, 1900

R. I. B. A. EXAMINATIONS IN CANADA.

The Royal Institute of British Architects has decided to hold qualifying examinations for Associateship in the Colonies. Montreal has been selected as the examinations centre for the Dominion; the first examinations will be held in June, 1901 (from Friday, 21st, to Thursday, 27th). The subjects embraced in the examinations are: (a) Design; (b) Architectural Styles; (c) Construction; (d) Building Materials, Sanitary Science, Specifications and Estimating.

These "Special Examinations" are open to artists of not less than 25 years of age working in the Colonies, either as Architects in practice or as Assistants."

An Associate of the Royal Institute is admitted (under the charter of the Association) to full membership of the Province of Quebec Association of Architects without further examination.

As some who might otherwise wish to take advantage of these examinations may be deterred by lack of special facilities for study in preparation for them, the Professor of Architecture in McGill University has arranged to give a special course of lectures this winter, if a sufficient number of students comes forward, the course to embrace the subject of Architectural Styles, their Features, Mouldings, and Ornament. The lectures will comprise a study in detail of the three great divisions of historical architecture, Classic, Mediæval, and Renaissance, in accordance with the programme of the Royal Institute. Three lectures will be given per week, illustrated by diagrams, casts, lantern views, photographs, etc. For students attending the course the Architectural Library will be available for reading and reference; it is open in the evening from 7.30 to 10.30, as well as during the day.

The days and hours proposed for this special course are Tuesday, Wednesday, and Friday, either from 8 to 9 a.m. or from 5.30 to 6.30 p.m.; but these may be altered to suit the convenience of the class. The first lecture was given on Tuesday, October 2nd, at 5.30 p.m., in the Classroom, Engineering Building. The fee for the course is fifteen dollars.

ARCHITECTURAL CASTS.

The collection of architectural casts in the Architectural Department of McGill University, has been supplemented by several purchases made by Prof. Capper during his recent visit to Europe. These include a cast of the centre slab of the southern portion of the frieze of the temple of Apollo Epikourios at Rhigaleia. The subject, which is in high relief, is the combat between Theseus and the Queen of the Amazons. This frieze is perhaps the most important example of advanced fifth century Greek architectural sculpture after the frieze of the Parthenon at Athens, of which a large and representative selection has already been placed in the collection at McGill. A cast of a charioteer from the frieze of the Mausoleum at Halicarnassus, dating from the fourth century, is remarkable for its spirited treatment.

A draped female torso is reproduced from the original bronze in the National Library at Paris, and a number of representative busts, which will be specially useful for purposes of comparative study of ancient art, have been purchased in Paris and London. Amongst these is the head from Tello on the Euphrates, at least two thousand years older than the Christian era. The original, which is in the Louvre, is known from the cuneiform inscription as Gudea. The bust well illustrates the differences between ancient Chaldean and Egyptian work, the latter being admirably exemplified by the bust already in the collection of Khafra, the Pharaoh who built the second pyramid, whose death is approximately 4,000 B. C. There is also a series of Greek heads, an Ephebus from a fifth century bronze in the Louvre, of the Attic school; the famous Bologna head of bronze, which Professor Furtwaengler thinks an ancient copy of an early masterpiece of Pheidias, of the Lemnian Athena. Besides these, there are copies of the "Sorrowing Demetei," now in the British Museum, dating from the fourth century B.C., the Aberdeen head, also in the British Museum, which is ascribed to Praxiteles, and may be from his own hand; and a full sized head and bust of the famous Venus of Melos (Milo), a reduced full length copy of which the university already possesses. There can be no doubt that these form a considerable addition to the architectural room and that they will greatly assist in the illustratioo and elucidation of the new course of lectures on Ancient Art, which are to be given for the first time at the university this winter.

MR. G. EMILE TANGUAY,
President of the Province of Quebec Association of Architects.

HISTORY OF ART AND ARCHAEOLOGY

On this subject a series of lectures are to be given during the coming winter by Prof. Capper, head of the Architectural Department of McGill University. The first of these lectures illustrated with excellent views of Egyptian and Grecian Architecture, was delivered recently before a large audience of ladies and gentlemen.

PERSONAL.

Mr. J. Emile Vanier, the well known civil engineer, of this city, was accompanied by his family recently sailed for Paris.

ILLUSTRATIONS.

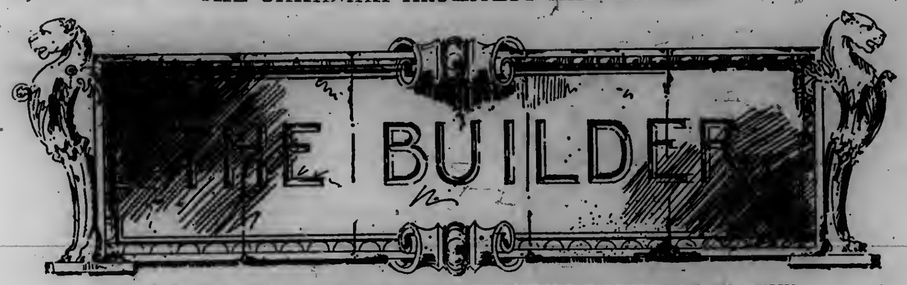
RESIDENCE IN NORTH TORONTO.—A. FRANK WICKSON, ARCHITECT.

WAREHOUSE ON FRONT STREET WEST, TORONTO.—MESSRS. GORDON AND HELLIWELL, ARCHITECTS.

HOUSE ON LOWTHER AVENUE, TORONTO.—MESSRS. CHADWICK AND BECKETT (MEMBERS OF TORONTO ARCHITECTURAL EIGHTEEN CLUB), ARCHITECTS.

CARVED OAK MANTELPIECE IN OLD HOUSE AT DARTMOUTH, ENGLAND.

The house and room in which this old mantlepiece are to be seen are situated in the street called the Butterwalk, at Dartmouth, in Devonshire. The room also contains a handsomely carved oak cornice. The oak is as black as ebony. In this old house, the erection of which was commenced in 1635 and completed in 1646, Charles II is said to have held his court in 1671.



[THIS DEPARTMENT IS DESIGNED TO FURNISH INFORMATION SUITED TO THE REQUIREMENTS OF THE BUILDING TRADES. READERS ARE INVITED TO ASSIST IN MAKING IT AS HELPFUL AS POSSIBLE BY CONTRIBUTING OF THEIR EXPERIENCE, AND BY ASKING FOR PARTICULAR INFORMATION WHICH THEY MAY AT ANY TIME REQUIRE.]

Quantity of Mortar Required for 1 M Bricks

THE amount of mortar required to lay 1000 bricks will vary with the size of the bricks used, and with the thickness of the joints. With the standard size of bricks, which should be 8¼ in.x4 in.x2¼ in., a cubic yard of brickwork laid with half-inch joints will require from 0.35 to 0.40 cubic yard. If the joints are one-quarter to three-eighths thick, a cubic yard of brickwork will require from 0.25 to 0.30 cubic yards of mortar; or 1000 bricks will require from 4 to 5 cubic feet of mortar. If the joints are one-eighth of an inch thick, as for pressed brickwork, 1000 bricks will require from one and one-half to two cubic feet of mortar. This being known, it should not be difficult for an estimator to be able to to tell exactly the cost of the materials required to build up 1000 bricks in a wall, having the cost of bricks, sand and lime at hand, including hauling, with the above data before him. It is a little difficult to tell exactly how many bricks a man will lay in a day of ten hours, as conditions vary, and some men are much more expert than others; but if well supplied with material, and no scaffolds to adjust, and a long wall to work at, from 15 to 16 hundred may be considered a pretty good day's work. If, however, there are many openings to fit around, or neat facing to do, from 1000 to 1200 will be a good average day's work. In good ordinary street fronts, from 800 to 1000 is a good day's work; but in the finest front work, when there are numerous angles, doorways, belting courses or cornice work, from 200 to 400 is a fair day's work. In large works, such as factories, warehouses, or similar buildings, or where walls are very thick and the work coarse, a good man will lay from 1,700 to 2,000 bricks a day; this, however, is rather the exception than the rule, and the lower figure is the safest to estimate upon. A good laboring man will mix mortar and carry it and bricks for three bricklayers, if mortar and bricks are not more than 25 feet from the building, and provided he does not have to carry water or climb a ladder. In all cases, however, the lime must have been slaked and is in a putty state, and this is an item the estimator must consider. To slake lime and run it off and have it ready for the laborer to make into mortar, as a matter of cost, depends on the quantity made at each slaking. As the brickwork of a building rises so also does the cost. Whatever may be the figures obtained as the cost of laying 1000 bricks for the first story, 5 per cent. should be added to it for laying the bricks of the second story, and 12½ per cent. for the third story, and a corresponding percentage for the work laid in higher stories. Getting the figures giving the cost in situ of brickwork, is one of the easiest problems in estimating, yet, how seldom two estimators give in figures alike?

Measuring Plaster Cornices.

IN making an estimate for a plaster cornice, several things are to be taken into consideration. (1) Measure the whole length around the wall, and deduct one projection of the cornice each way for the main length. If the girt of the mouldings from the ceiling to the wall line is under six inches, take it by the foot running measure, but if more than six inches, charge by the foot superficial. When there are eaves to the cornice, charge then by the foot superficial, bending a tape-line round in the concave; count all angles and mitres above four, taking measurements on longest lines. When there are enrichments in connection with the cornice, other than running mouldings, such as lambrequins or set ornaments, charge them extra according to their value, at so much per running or superficial foot. All quirks, arrises, heads or ovolos should be charged by the running foot. Pateras, which save mitring of enriched soffits are not to be taken unless in a frame or coffer; these must be charged under their own department. Plastering on brick walls to be measured from top of ground to lowest member of cornice, but where the walls are lathed, the whole height of wall must be measured. Stucco should be measured by the yard superficial, and charged according to the style and quality of the work.

For Estimating Masons' Work.

THERE can be no set price given for stone-work that will suit all locations and all styles of work and qualities of of materials. The estimator must ascertain for himself the prices current of labor and materials in his own neighborhood, for the style of work he is figuring on. The following will be useful rather as aids in obtaining the quantities and defining the style of work, than in giving him the price for it, but, after obtaining the quantities, and getting the local prices, the cost of work may be readily found. Walls made up of rubble stone are sometimes measured by the toise, (French), which contains 87.16 cubic feet; some measures only allow 84 feet. In Ontario it is chiefly measured by the cord of 100 feet in the wall or 128 feet in loose stone, a difference that should be noted. Sometimes stonework is measured by the perch, and again by the cubic foot or cubic yard. Walls measuring less than 1 foot 6 inches in thickness are always counted for the builder as 18 inches thick, but, the man furnishing the stone is entitled to the cubic feet only. Walls over 1 foot 6 inches thick and not over 2 feet 6 inches thick, are measured as 2 feet 6 inches in thickness. Footings are always measured extra according to their size. If very large stones are used, an extra charge is made per foot on them. Face work of a superior kind on rubble masonry is always measured separately, and

charged according to style of finish and character of work. Quoin stones, made from picked quarried stones and hammered or dressed, are counted as on other dressed work of a similar kind. A good way is to charge the wall right up as so many cords, at so much per cord, and then add cost of picking and dressing the stone afterwards. Walling of block stones is charged up at so much per cubic foot, according to description, similar to ashler prepared and set, including all beds and joints, but the face is charged extra at per foot superficial, according to the way it may be dressed.

Working Ashler Masonry.

In ashler work, where it is plain and of an even surface produced without sinking more than is necessary to remove the mere irregularities of the stone, the price will be regulated according to the quality of the stone and the amount of labor bestowed upon it. For limestone or easily washed sandstones, the prices will not be hard to determine, but with granites and other hard stones the cost of working can only be got at by experience and a knowledge of local conditions. All sunk work in ashler, is the cutting or chiseling below the plain surface, as in rebating, or the weatherings of string courses, copings or cornices. The width, depth, shape of the face of cutting and hardness of stone must all be considered when making an estimate of this work. It is always best to estimate by the superficial foot on this work, for most of it will vary in width and depth, with the exception, perhaps, of weatherings and string-coursing. Circular work, so-called, will include all work having convex or concave surfaces, such as the shafts of columns, arch stones, circular curbs, circular or elliptical stair work, groins, tower work, or other similar work, and the estimator will require to be generous with himself in figuring up this description of work, both as regards labor and material, and ample allowance must be made for unforeseen contingencies. It is always a dangerous method, or rather want of method, to "lump" this kind of work, there are so many opportunities for leakage. The cost of moulds and models must be counted on, extra wastage of material must be considered, and the labor required to do the work will be of the most expensive kind, all of which tend to swell the bill of cost. Circle on circle work, such as arch work in a tower, or the forming of a spherical niche head in a circular wall, always means a great waste of material, and the employment of the most skilled labor obtainable, factors that must be considered when making an estimate of this kind of work. The better way to estimate circle on circle work in stone, for amount of material required, is to make a cube covering the whole dimensions of the similar work both in elevation and plan, and then add 25 per cent. to the contents which will give just about the amount of materials required to complete the work. Straight moulded work, such as cornices, running mouldings, and similar work, may be counted by the running foot, and the cost determined by the girt and the number of members in the cornice. Circular moulded work, such as the mouldings around the necks of columns, cornices around towers, or circular oriels, may be charged by the running foot, and the price per foot determined by the girt of the moulding and the number of members in it. Circular work of all kinds costs from two to three times as much as straight work of the same face, and work having a double curvature or circle on circle work, costs from three to five times that of straight work having the same face. The correctness of an estimate for this kind of work will depend largely on the skill and experience of the estimator, who is supposed to have a thorough knowledge of the character of the work he is figuring on. It is not safe for any young contractor to make an estimate on work of this kind if he has had no experience in this department, and he is advised to consult some person of experience, some old builder, or better still, some city architect, who is not interested in the work, and who is known to have erected stone work of the kind under discussion. The cost will be but little, and it may help to prevent serious disappointment and loss. In stone buildings of the better class, the simple walls, not including windows, doors, cornices or other embellishments, may be rated at the cubic foot where the work is of one kind, and when the work or material differs from the front wall, rate it at per cubic foot at a greater or lesser rate as the case may demand. Ascertain the full cost of one window and opening, then rate all similar windows likewise, the same with doors and openings. The total cost of a single column multiplied by the number of columns, gives the figures required. The cost of one foot of cornice or belting course or running moulding, obtained, multiplied by length of work, gives the whole cost. Carvings and other sculptured work should always be estimated by the piece.

ADHESIVENESS OF GLUE.

A WRITER in one of our foreign exchanges says that the adhesiveness of glue under favorable circumstances is equal to a force of at least 715 pounds per square inch. In an experiment performed, a force of 1,260 pounds, applied gradually, was found necessary to separate two cylinders of dry ash wood, the ends of which presented a surface equal to 1.76 square inches, and which were glued together end to end and allowed 24 hours to set. Even this weight was sustained for two or three minutes before the joint gave way, and it was found, on examining the separated surfaces, that the glue was very thin and had not entirely covered the surface. The cohesive strength of glue appears, therefore, in this experiment to have been rather more than 715 pounds per square inch, while the cohesive strength of the wood thus united in a lateral direction was found to be only 562 pounds, thus showing that if the joint had been between the sides instead of the ends of the pieces of wood the wood would have given way before the glue. In this case, however, the glue was newly made and the season very dry, while in some former experiments made in the winter season with glue which had been frequently made, with occasional additions of glue and water, the cohesive force indicated was only 350 to 500 pounds per square inch.

The body color of a recently repainted house is a light shade of French gray, made from white lead, raw umber and a little lampblack; the trimmings are ivory white, and the blinds are a dark green, having an olive cast. The same color, but a trifle darker, has been used for the sash and also for the front door. The rough cast stone base is a dark olive, while the floor of the piazza is just a trifle darker than the body color. The house is set among large trees, and the general effect of the whole is specially pleasing. On the opposite side of the street another house has been painted a rich cream color, the trimmings being a lighter shade of the same, and the blinds and the sash bronze green. The brick base is a warm reddish brown, just a trifle too strong to be agreeable.

LOW PRESSURE HOT WATER HEATING.*

By J. Nelson Russell.

In upholding the claims of low pressure hot water heating this evening, as being the most suitable for the majority of installations, I have endeavored to take up some points which are outside the beaten tracks, and I trust that my remarks may be sufficient to give food for discussion and exchange of ideas.

The popularity of this method of warming is unquestionable, and, in my opinion, it will hold its position for years to come, in spite of the advancements in the methods of heating by steam and other agents.

That there must be reasons for this, and this is not merely due to the wishes, and perhaps caprices, of those engineers who claim its advantages, is patent to all, since no system will stand the full test of time unless the advantages claimed for it are borne out in practice.

Any apparatus, to be to the satisfaction of the client, and to the credit of the contractor, must, beside being efficient and fulfilling the guarantees given, be easily attended to and economical.

EASILY ATTENDED TO.

To fulfill this condition, an apparatus must be in as large a measure as is practicable, unaffected by fluctuations of the fire, must be able to be attended to in the evening, and yet warmth provided through the night. In small installations, it should have no parts that require skilled attendance whatever, or in larger plants, where such attendance is available, it should be reduced to the slightest degree.

Upon this head the system of low pressure hot water undoubtedly takes premier place.

As water is one of the finest agents we have at our disposal for the taking in and giving out of heat at all temperatures, we have therefore the best material to deal with.

In a system with runs of pipe for the heating surface, the contents of the apparatus is sufficient to enable an almost constant temperature to be maintained, the boiler power being, of course, in correct proportion.

In a radiator system, although the contents for the same heating surface is much less than in a pipe scheme, yet it is in excess of that of high pressure hot water or a steam scheme, and, in the event of the fire lowering below the power required to maintain the apparatus at full temperature, all the heat conserved in the circulating water is available ; whereas the effect in a high pressure apparatus is much more rapid, and in a steam apparatus on the reduction of the temperature to 212 degs., the steam, after giving off its latent heat, returns to water, and to the boiler, and is of no further use for radiation in the apparatus until the fire is re-lighted.

With regard to the attendance to the apparatus, the putting on of fuel, the regulating of the draught, and the cleaning of the grate, these must be seen to in any scheme.

In the low pressure hot water system, the water will circulate at whatever temperature the fire is capable of raising it to, and if the fire is too fierce, the open air pipe is brought into use, and the apparatus will be freed from the steam and excess of heat until such time as the excess is lowered.

With a gravity steam apparatus you may say that such excess is kept in check by the automatic damper control, and to this I agree, but automatic devices are not infallible, and there may come a day when the safety valve may be brought into action, if in the meantime it has not stuck fast.

With the system of this paper, skilled attendance is certainly at a minimum, and an apparatus once installed will work, year in and year out, with intermittent attention to air cocks, safety valve, and cold water service.

Compare this with the high pressure hot water, with its yearly pumping through by skilled labor, and with its periodical filling, which if not attended to, will in time prevent circulation, with the inevitable result of the destruction of the furnace coil and its replacement.

ECONOMICAL.

This is a side of the matter which affects the client far more than the contractor. Give him a scheme which is effective, easily attended to, and yet burns more fuel than one of similar proportions upon another system, and he has cause of complaint, however satisfactory everything may be.

Let us look into the points upon which there may be waste of heat.

The proportions and design of the boiler, and the use of the heat in the gas from the fuel, are, of course, large factors for economy or waste.

Take for granted that, so far as those items are concerned, we have a gravity steam system, a high pressure hot water system, and a low pressure hot water system, each to do equal duties, and each of the highest class of design and workmanship.

Is it possible to say that either has the preference for economical working above the others ?

Is there any possibility of waste of heat from the radiators or coils, which contain a large proportion of the heating surface of any installation ?

It is an almost universal practice that these should be placed upon the side of the room which is the cooling side and in the majority of cases they are placed beneath the glass surface, the greatest cooling factor of all, and, as we have not only to consider the warming of the room, but also the checking of cool cross draughts as well, this is undoubtedly the correct position, but for economy in heat it is just the one place of all which gives opportunity of waste.

The rising column of heated air from the radiator is brought at once in contact with the greatest cooling factor, increasing the difference in temperature between the interior and exterior of the glass, and thereby increasing also the rapidity of the heat transmission, the whole of which is waste, pure and simple.

This is the result also, only in a lesser degree, if the radiator is placed upon an outer wall between windows.

Is there any means of prevention, without placing our heating surface elsewhere ?

Yes, a partial one.

How ?

Lower the temperature of the ascending air column from the radiator by reducing the temperature of the water or steam in the radiator itself.

It is evident that if we have a steam radiator working at a pressure of 10 lbs. per square inch, i. e., 240 degs. in one room, and another at atmospheric pressure, i.e. 212 degs., in a similar room, the ascending air column and the heat transmission through the glass in the first case will be higher than in the second.

If we have a third room with a radiator worked by hot water at a temperature of 170 degs. we shall have a lower heat transmission than in either.

It is therefore possible to effect economy of heat, and therefore fuel, by working heating apparatus at low temperatures.

This is doubtless one of the items that tend to the economy given by the atmospheric heating system, upon which we had a recent paper from our president, but even then the steam system upon those lines is only able to obtain temperatures approaching those at which hot water systems are worked, and not to get beneath them.

Therefore, on this head, I place hot water in the premier position for economy.

Secondly, heat is transmitted from a radiator or other heating agent by three well-known methods :— Conduction, radiation, convection.

Conduction.—This is affected by the thickness and the nature of the metal, and can be taken as alike for all.

Radiation.—The heat units given off per square foot of surface is given us by Dulong and Petit for cast-iron for a difference of temperature of 90 degs., 115 by radiation against 100 by convection, and at 180 degs., 120 by radiation against 100 by convection.

These radiant heat rays pass through the air without being absorbed or raising the temperature of the air to any appreciable extent, giving up their heat to the object in the direct line of passage.

In the catalogue of one of the heating and ventilating engineers there is a quotation to the effect that "Heating should be done by means of radiant heat," but on this head I am not in agreement with them, unless they wish to infer that rooms should only be heated by open fires.

If a room is warmed by means of an open fireplace, the heat by convection is largely passed up the chimney, and therefore the radiant heat is a large and predominant factor in the heating of the rooms.

After leaving the fuel, it is, on striking the walls, furniture and individuals, at a greater temperature than that of the rooms, and capable of imparting heat, since it starts at a high temperature from incandescent fuel ; but in the case of a steam or water apparatus the temperature of the source of heat is only counted in hundreds of degrees, instead of in thousands, and the radiant heat correspondingly lowered.

As the walls of a room are always absorbing and passing the heat through them, and are at a lower temperature than the air of the room (at times when heating apparatus is required to be in use), it follows that those rays which reach the walls are there absorbed, passed through, and are not utilised in warming the air of the room.

If this be so, the more we can reduce the ratio of radiant heat emission, the more economical will our apparatus be, and one of the ways of doing so is to keep the temperature of our radiating surfaces low, and thereby to lower the heat units given off by radiation in proportion to those by convection, and in this item low pressure hot water is the most favourable.

Convection.—Air in motion rubs against its other particles, and against objects with which it is in contact, and it is upon this method that we rely for the removal of heat from the heated surface to the air of the room.

The name of "radiator" is misleading, as it is through convection, and not radiation, that its duty is fulfilled.

Radiators should be of a pattern giving freedom of air access to all parts, so that the movement of the air is unimpeded.

The form of the radiator has also a bearing upon the two items of radiation and convection, patterns with the radiating faces parallel with each other as much as is possible being the most efficient as regards conservation of radiated heat, but all the patterns of that description upon the market at the present time have a greater disadvantage in connection with convection, in having such faces far too close together. If the distance were doubled or trebled the effect would be much improved.

We all doubtless have read the paper of Mr. M. O. Kasson, from which the following is taken :

"Select a room which is heated by a single radiator well out from the wall, and make the following experiments under the same conditions of outside temperature, or as nearly so as possible. After it has been ascertained what maximum temperature can be obtained in the room in a given time under the normal condition of the radiator, cool off the room to the temperature at which you started. Then cover the top of the radiator with a board, and turn on the steam again. You will find that it takes about 25 per cent. more time to reach the maximum temperature with the radiator handicapped in this manner, although you have covered only a small portion of its radiating surface. Then repeat the operation, covering the top and three vertical sides of the radiator, when, even though the boards do not touch the radiator, you will find that it will take about twice as much time to heat the room as in the first instance.

"To prove these two experiments, cover four sides of the radiator, leaving the top exposed and space for the air to enter at the bottom. In this case you will find that the temperature of the room is raised even more rapidly than when the radiator was not covered at all, because by boxing in the radiator, as just described, you have created a draft of air up through the heating surface, and thus materially aided the convection of heat."

Unfortunately he does not give us the data as to the amount of steam condensed, but if you try the experiment yourselves, you may be prepared to find that in the one in which the convection was assisted, the amount of steam condensed to do the same work would be the least.

The various makes of radiators on the market are listed at their exterior heating surface, but take one of each pattern, ascertain the actual heat duty, and how varied the results will be. We have far too many which are well described by Mr. Kasson's experiment of having a board on top—far too many with the inner surfaces boxed in to such an extent that the convection is slow.

I wish to point out to you, in closing, that the opportunities I have pointed out are small in themselves, doubtless, but multiply them by the total surface of the apparatus, and add the saving in the heat emission due to the reduction in temperature of the mains in positions where heat is wasted, and the result for the season will turn out to be an appreciable one after all.

*Paper read before the Institution of Heating and Ventilating Engineers of Great Britain.

Too many advertisers consider their advertising as an adjunct to their business. Here is where they make the fatal mistake ; advertising is not an adjunct, but a part of the business, as much as is the buying and selling of goods.—The Advisor.

THE BOND OF BRICKWORK.

'Tis a matter of great importance to the brickmaker that bricks be well laid and well bonded, writes Mr. George F. Tiffany in The Clayworker. The bond premarily depends on the cohesive nature of lime mortar. If the bricks are not wet when laid on the mortar will adhere whether the bricks be smooth or rough. Masons generally are of the opinion that mortar will adhere better to a rough brick than a smooth one. This is probably owing to the fact that a rough brick can be rapped to place with less liability of breaking the bond of the mortar. A smooth dry brick allows but little movement and it must be quickly made, or the brick will slip on the mortar and must be relaid with fresh mortar. In rapping a rough surface brick to line the mortar moves with it, but this is no evidence that the mortar, when set, will adhere more strongly to the rough brick.

One would naturally think that the air confined in the interstices of a rough surfaced brick would in some degree prevent the adhesion of the mortar. This would undoubtedly be the effect if the brick were not porous, so that the air could not escape through the rough brick. But the tenacity with which mortar adheres to glass, a perfectly smooth and nonabsorbent body, is evidence that brick may also be smooth and nonabsorbent and make equally as good a wall as rough brick.

One need not be a very close observer to learn that in the taking down of brick walls some brick will lift easily from their places, leaving a smooth and perfect mold of the brick in the mortar, while others have to be struck with a force that frequently breaks them in pieces, and, if lifted without breaking, take a portion of the mortar with them covering the whole surface of the brick; the separation being in the mortar, and not between the mortar and the brick.

What makes this difference is a very important question. The defect has been attributed generally to the laying of dry brick. But the remedy has been known so long and is so simple that we are assured that other causes may produce this effect. Is not mortar oltentimes used in too new a state, that is, before the perfect working and mixing of the sand has been made? Is there not a giving off of gas from the mortar in the joint also a cause for this weakness?

It is more important to lay a brick under such conditions that the mortar will make a good bond than to make a true, smooth wall. What matters it how well the wall may look, if, in a short time, the arches crack and the sections slip by each other, not only presenting a very unsightly appearance, but proclaiming that the structure is unsound from cellar to garret. It might be profitable to consider the question, can a good mortar bond be secured when bricks are laid hot and the mortar freezes soon after the brick are laid? Is not the practice of building brick walls in the winter very objectionable?

If a brick wall is expected to withstand the ravages of fire the sand in the mortar must be a flint sand. A limestone sand will, of course, turn to lime and the slaking of the lime will break the mortar bond and disintegrate the mortar. Brickmakers who have unwittingly used lime sand in their clay for making brick will appreciate the importance of this warning. A sand that is affected by the action of acid will also be affected by the action of fire.

The steel structures in which the girders and posts are partially protected by fire-proofing have, in some degree, disappointed expectations in regard to their fireproof qualities, although practical men could plainly foresee that, if there was enough combustion to heat the lower part of such a building to redness, the whole fabric would collapse. The steel cannot be considered as a bond to the brickwork, for the principal constructive element is steel, which, expanding and contracting, makes every change of temperature tend to disrupt the brickwork. The steel structures serve a useful purpose as office buildings, and the writer does not wish to speak disparagingly of them, but rather to emphasize the fact, which all experience affirms, that there is no better obstruction to the passage of fire than a heavy, well-bonded brick wall.

We were once very painfully impressed with the importance of such walls. It was in the year 1857 or '58, at a fire in Lake street, Chicago. A brick store was being burned out. Its east wall projected high above the roof of an adjacent frame building from which people were carrying out the goods.

We said to a gentleman near by, "If that wall stands the fire will go no further, and suggested that braces should be set against it from the roof of the frame building. But very soon the wall toppled over on the roof, carrying it down with the floors of the building and burying a dozen brave men beneath its ruins. If that wall had been one-half brick wider, or better bonded, it might, perhaps, have stood the trial. Why are men so economical of space and material when life is imperiled?

"Ah, me! that land should be so dear,
And human life so cheap."

The word bond, in relation to brickwork, refers to the laying of brick across the wall, thus bonding two vertical courses together. The end of a brick, excepting on the corners of a wall, is unsightly. The English and the Flemish bonds secure much stronger walls than are generally found in the fronts of the buildings, but the long rows of headers in the one and the checker-board appearance of the other prevent their being much used for fronts. It is generally true in architecture and mechanics that the form which is most pleasing to the eye is also the simplest and best adapted in every way to the purpose for which the object was made. This does not appear to be true in brickwork. The vertical courses are very weak without headers to bind them together. The temptation to leave them out is too strong. Beauty and strength do not meet in harmony in a brick wall. Who has not been astonished at the lack of bond in a building that has been burned out, while looking at its shattered walls.

Often a chimney is seen standing erect and sound among the ruins, indicating so plainly if the walls had been as carefully built they might also be standing. There is no question that division walls should be made heavier, or at least have an occasional buttress, which would greatly increase their stability. Certainly they should be made so that they will stand when all combustible material in the structure has been consumed.

For the form of bond for such walls there is none better than the English bond. For store fronts and dwelling houses, for all walls having an exposed surface, and especially for all hollow walls of brick, we need a bond that does not require the cutting of brick to form the bond, that the wall will appear to be all stretchers, and that will cost no more to put in a bond course than a course all stretchers. The use of band iron for binding the face course to the wall of a hollow wall is not in keeping with the stable character of brickwork. We present to the architects and to the practical judgment of masons and brickmakers a form of bond which we believe meets all requirements.

A split brick is a standard form of fire brick and should also be of common brick. It is the principal form in the bond shown above. Whenever we wish to use a bonding course we use use a split brick, as a stretcher on the face of the wall, which covers the ends of the bricks laid across the wall.

Fig. 1 represents a solid one and one-half brick wall.

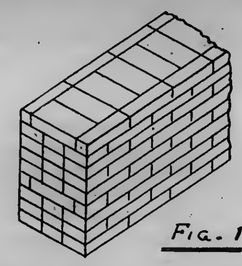


Fig. 1

It is faced alike on both sides, with all stretchers. Notice that this is done with a saving of face brick, as each split brick takes the place on the surface of the wall of two face brick used as headers. There is nothing so nice for a courtyard wall or for a brick and one-half wall in any place where even one side is exposed.

Fig. 2 is a brick and one-quarter hollow wall. All

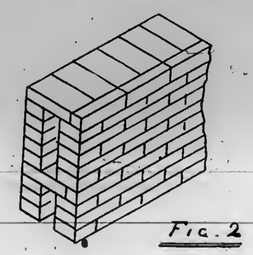


Fig. 2

stretchers on the face having a hollow space of one-quarter of a brick in width.

Fig. 3 is a one and three-quarter brick hollow wall,

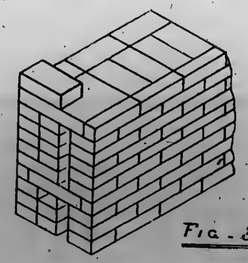


Fig. 3

all stretchers on the face, and having a space of one-quarter of a brick in width.

It will be seen that heavier walls, varying in width by a half brick, either hollow or solid, or with both, by one-quarter of a brick may be made.

MANUFACTURES AND MATERIALS

SLAG CEMENT.

The manufacture of cement from iron slag has become quite an important industry in Germany and Belgium. The cement when mixed with three parts of sand is said to have an average tensile strength of more than 350 pounds to the square inch after 28 days, and more than 600 pounds at the end of a year. The product of the mills in Belgium and Germany is said to be sold months in advance of its manufacture. It is not a competitor of Portland cement for the finer kind of work, owing to its unfavorable color, due to the presence of oxide-of-iron, but is used for the rougher purposes such as foundations for buildings and streets. The rapid growth of iron manufacturing in Canada will probably in time lead to the manufactute here of this kind of cement. Some of the American iron manufacturing companies are said to be now giving attention to the subject.

ENGLISH CEMENT COMBINATION.

There has been considerable talk and speculation about the proposed combination of the Portland cement producers of Great Britain. Particulars are now at hand, and it is said that the new trust will control about 80 per cent. of the output of the United Kingdom.

The share capital is £5,000,000, divided into 250,000 7½ per cent preference shares of £10 each 250,000 ordinary shares of £10 each, while the company is authorized to issue £3,000,000 first mortgage 4½ per cent. debenture stock.

The association was formed for the purpose of purchasing the undertakings of concerns engaged in the manufacture ot Portland cement. With the exception of three, all the works are situated on the Thames amd Medway. It is believed that upwards of 80 per cent. of the entire output of Portland cement in the United Kingdom is produced on the Thames and Medway. The total production of cement on these rivers in 1899 has been estimated at 1,700,000 tons, whereas the estimate of production in 1895 was only 1,350,000 tons. This difference is due to the largely increasing demand for Portland cement. The production of the firms taken over by the association was, in 1897, 1,222.240 tons; in 1898, 1,337,268 tons, and in 1899, 1,404,569 tons, while their capacity now is about 1,570,000 tons. The profits are said to have shown a satisfactory and progressive increase. Notwithstanding, cable advices state that the offering of stock was not a success.

MANUFACTURING NOTES.

The Boston Lumber and Brick Co. has been incorporated with a capital of $40,000 and headquarters at Sault Ste. Marie.

The Canada Paint Co., of Montreal have been awarded a medal for their exhibit at the Paris Exhibition of mineral pigments mined in Canada. The exhibit is instructive, representing the minerals in their various stages of manufacture—first, as mined; second, as prepared for the oil in varnishes and colors; third, as made and applied.

A great honor has been conferred on the Canadian Office & School Furniture Co., Preston, Ont., by the award at the Paris Exposition of a Silver Medal for school desks. The exhibit was made at the instance of the Government to supplement the educational display. The silver medal is the highest award which could be given by the judges, and the fact that a Canadian firm secured it is a matter of congratulation. The desks shown by the firm have attracted general attention, and in consequence, a

number of applications for price lists and samples have been received from all parts of the world.

A new Portland Cement Manufactory is being constructed at Brookholm, near Owen Sound, by the Grey and Bruce Portland Cement Co.

The Metallic Roofing Company complain that owing to a discrimination of railway rates in their favor, manufacturers of architectural metal goods in the United States are able to pay the Canadian import duties and undersell the home munufacturers.

Mr. Samuel Cabot, of Boston, the well-known manufacturer of shingle stains, is sending out to architects and others interested, a series of half-tone plates, showing various examples of recent suburban architecture by well-known architects, illustrating the styles of building to which shingle stains are adapted.

The Gurney Foundry Company state that they have done a larger volume of business this year than ever before in their history, and are finding their premises too small for the requirements of their business. They have largely increased the capacity of their moulding shop. For two or three years past they have been obliged to rent outside storage accommodation. They have this year put on the market a new style of wood furnace embodying a number of improvements. The large demand throughout Canada for their goods has caused them to neglect, to some extent, the export branch of their business. There is found to be more profit in the goods sold in the home market. American competition is very keen in Great Britain and the American manufacturers, in addition to having been longer established, have a considerable advantage in freight charges being able to ship very cheaply by canal from Buffalo to New York and place their goods directly on the steamships in that city. The British manufacturers are also said to be waking up to the possibilities of their own market and are steadily improving the character of their goods.

DINING ROOM PROPORTIONS.

In the dining-room there are certain practical points which to some extent dictate the proportions. Thus, in a small room it is more convenient for serving if the plan is nearer the square, whereas for a large dining table the plan may with advantage approach the double square, provided sufficient height can be given to the room. The largest room on any floor often fixes the height of all the rest, and Chambers recognises the impossibility on this account of employing the best proportions in the smaller rooms. The following suggestions are taken from Gwilt :—For square plan and flat ceiling, height to be not less than 4/5 the side, nor more than 5/6; for longer proportions the height may equal the width; where a cove is employed the proportions should be increased. One of Palladio's rules for long rooms (as opposed to square) was to add length to width and take ½ the sum as height. The appearance of a room having too great a height may be improved by a predominance of horizontal lines in its decoration, and vice versa.

POROSITY AND DURABILITY OF SLATE.

Determination of the porosity and durability of slate when exposed to the influences of weather, is a question which interests the sanitary and building arts in an eminent degree. Mr. Lariviere made an interesting communication on this point to the Commission of Testing Methods for Building Materials, established at the Ministry of Public Works, and this is printed in a recent number of "Vie Scientifique."

It is difficult, says Mr. Lariviere to determine the porosity, because as a rule schists are but slightly porous, and because care must be taken not to confound the water between the layers of cleavage with the water really contained by the pores of the substance of which these layers are composed.

To estimate the degree of porosity, two identical plates are cut with a band saw from the same slate and then dried. When this is aceomplished the weight p of one of them is found, and then the piece of slate is smeared on every side with an oily coating of known weight d, so that the weight p₁ of this coating can be found.

Having estimated the weight of all, it will be easy with these data to calculate that of the dry slate. The other piece of slate is employed to calculate the weight when saturated with water; in this case only the edge of the slate is coated with grease before saturation. Comparison of these two densities will give the volume of the pores. It would be interesting to ascertain by study the amount of water absorbed by a square meter of roofing slate fixed with hooks, as in building, on a frame-work having the minimum slope employed for such roofs. The frame would be subjected to a regular rain of known intensity during a given time. To obtain such a shower the ingenious apparatus invented by M. Schlœsing could be employed, as was recently done by Mr. Aime Girard to ascertain the degree of adherence to plant leaves of the various cupreous mixtures which are utilized to prevent disease.

As regards the resistance to effects of weather, the methods adopted to study the action of frost on stones do not seem able to give any precise indications with schists, for the very fact that they are but slightly porous.

Slate only become porous when decomposed by the effects of weather, so that specification of these effects would be the point needed. Unfortunately there are no methods to determine the resisting power of slate to such influences any more than for stone. Experience alone can decide the question.

However, as a rule, we may say that the duration of a slate seems to depend upon the proportion of carbonate of lime and pyrite it contains. Crystallized pyrite is less injurious than that disseminated throughout the substance, the existence of which is often only revealed by the general decomposition which finally takes place.

Chemical analysis will then give valuable data. In analysis of schists the proportions of hygrometic water and the combined water, silica, iron, alumina, lime, magnesia, alkalis, all are determined; carbonic acid and sulphur should also be analyzed.

Professor Brunner, of Lausanne, recommends the following method, taken from Fresenius, to easily and rapidly estimate the quality of slates :—Take a sample of slate 7 by 3 centimeters and hang it by a cotton thread in a glass vessel containing 100 cubic centimeters of water saturated with sulphurous acid in such a manner that the slate will not dip into the liquid, then shut the glass and keep it in an ordinary temperature. Bad slate decomposes in a few days or even hours, becoming exfoliated. If it remain compact it will grow very friable and spongy. Good slate will preserve its primitive state for four to six weeks. A superior quality of slate has no sign of decomposition after several months. This rapid decomposition of bad slate is due to the presence of pyrite, carbonate of lime and magnesia. The pyrite is transformed into sulphuric acid which decomposes the other minerals. The carbonate of lime is transformed under the influence of humid air and carbonic acid into soluble bicarbonate.

CHIMNEY CONSTRUCTION.*

By E. J. Philip.

The construction of chimneys does not give us much thought, like many other things we have to deal with, until we have to construct one, and when you begin to look up facts it will surprise you how little real information there is to be had on the subject.

In the old country, where there are many large chimneys used for all purposes, there is on record much information both in reference to building, straightening and taking down. Most of the very high chimneys are used for other purposes than producing draft to burn coal, such as carrying off the poisonous gases from chemical works, etc. There is a book published called "Tall Chimney Construction," which gives the general details of many stacks built in the old country, and from these records you can make formula to guide you in designing a new stack.

Let us consider what is the proper method of designing a chimney for any given purpose. The first question is, "What is the chimney for, or what is it to do?" for this will govern some details of the shell. For instance, if it is to produce draft for ventilation, it will not require to be lined with fire-brick, nor will there be any benefit in putting in a loose lining.

We will suppose the chimney under our consideration is to induce draft to burn coal, as that is the most likely duty of any chimney that we will be connected with.

The size of the flue is the first dimension you will require, and it will depend on the quantity of coal to be burned and the velocity of the gases up the shaft. It is easily understood that as chimney powers increase, the dimensions do not increase proportionately. To illustrate this I will take some figures from a table in a reliable work :

A chimney 70 ft. high, 30" diameter = 100 h.p.
" " 200 ft. " 66 in. " = 1000 h.p.

That is, the high chimney with five times the area equals ten times the power; and while I am not sure that this proportion is right, it seems to illustrate the way the formula works. The only correct way is to calculate the number of cubic feet of gas going up the chimney at the average velocity, and the area of this column is the area of the chimney. The rate of combustion depends on the draft, and the draft depends on the height of the chimney and the temperature of the gases. The height of the stack is nearly always determined by the surroundings, as the stack must of necessity be above any buildings or hills, and I might say that the average stack is higher than is necessary. However, when there are no buildings or hills, the following formula will establish the height. This is known as Gale's formula :

$$= H\frac{120}{T}\left(\frac{F}{g}\right)^2$$

After getting the height, the area may be obtained by Kent's formula, which is : $A = \frac{.06F}{\sqrt{H}}$ In this rule the effective area is obtained and is two inches less all round than the actual area. This two inches is to make up the friction of shaft. We now have area of chimney and height of it. I might say that experience has shown that to burn hard screenings requires 175 feet stack, for buckwheat 150 feet, and for soft coal 80 to 100 feet. This is a pretty fair basis to start from. We will suppose our chimney is, say, 100 feet high and 40 square feet area. It looks a simple matter to construct a stack having this information, and so it is, only you must go about it in the right way. To continue your calculations after getting the size, you start at the top and work down. Authorities say that a chimney having a flue over five feet in diameter shall be 1½ brick thick at the top; from three to five feet in diameter, one brick; and under three feet, half a brick. A chimney five feet or over would have this size for the first 25 feet down and would increase ½ brick for each 25 feet. This, according to calculations, is almost too much. It can run 30 to 40 feet each stage, but will depend on kind of material, that is, whether hard or soft brick, and whether built in cement or lime; 30 to 40 feet will work with good material and workmanship. Having laid out the different thicknesses of wall, and knowing the batter, which varies with different builders and conditions from 1/16 to 3/8 of 1 inch, having this you can get the weight of shaft or chimney proper. In large chimneys it is usually specified what they shall weigh per cubic foot. After getting weight you can decide how much bearing surface you will require for the kind of soil you have at the foundation. Various bearing powers of soil are given as follows: Hard rock, native bed, 100 tons sq. foot; clay, dry, 4 to 6; moderate dry, 2 to 4; soft, 1 to 2; gravel and coarse sand, 8 to 10; sand compact and well cemented, 4 to 6; clean dry sand, 2 to 4; quicksand and alluvial soils, ½ to 1 ton per square foot.

When the ground is soft you would require piling or timbering, and to spread it out over a considerable surface. The weight in tons divided by bearing power of soil gives surface required. Wind pressure is also an important factor in getting the area of the base. I will not go into the rules affecting wind pressure, but experience has shown that at the base of shaft proper its diameter shall be 1/10th of height for square chimney, 1/11 for octagon, and 1/12 for round. In considering wind pressure it is usually figured at from 25 to 56 lbs., by different authorities. This must be resisted by foundation, as you can see that if the chimney rocks over with wind it will throw its entire weight on one side of foundation. In considering wind pressure it is necessary to take into account whether chimney is protected by buildings or standing in an open field. If the chimney is built into a building, windage may be almost disregarded except for piece above the roof.

There has been a great deal written and many discussions as to the merits of different shaped flues, but experience and tests have shown that a parallel flue is the best or as good as any shape. The arguments for taper flues are something like this, that the gases slow down due to cooling as they go up, and consequently they require more room, and the flue should get larger; others say that the gases cooling down contract in volume, and therefore the flue should get smaller so as to take the same shape as the column of gas. Experience has shown that both are correct The gases contract and get smaller and consequently need less room, but they also slow down in velocity, due to their greater weight and therefore need more room. In this way they just balance up and require a parallel flue. Authorities say a round parallel flue is the best for all purposes, and the nearest approach is the next best.

The chimney should be finished with a cap of some material that will stand the weather. I like cast iron best, but a cap can be moulded of Portland cement, and if the stack is for smelting work, of fire clay. These materials stand well, and if there is a ladder on the chimney they can be kept in repair. A ladder should always be built on the shaft, as it makes a means of examining it at any time, and if repairs are needed they can be done easily.

Lightning conductors are also approved and disapproved; but if a chimney is the highest object in its vicinity it is likely to take the discharge from a storm over it, and a properly erected conductor will carry it off, although many stacks are standing without any.

* Paper read before the Canadian Association of Stationary Engineers.

PUBLICATIONS.

The Engineering News Publishing Company, of New York, have issued the second of a series of Engineering Studies, by Charles Evan Fowler, M. Am. Soc., C.E. This part is devoted to illustrations and descriptions of notable Roman stone arches.

"Progressive Carpentry" is the title of a book of 90 pages, prepared by E. D. Meloy, architect and builder, Waterbury, Conn., and published by the David Williams Co., New York. The book, which is illustrated with numerous diagrams, is chiefly devoted to describing methods of roof construction.

Mr. D. A. Hewitt, of Toronto, has prepared and published in convenient book form, skeleton specification suggestions for architects, arranged in constructional order with index. The object of the author has been to provide the architect with an easier method of collecting data required in making a specification.

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AGENTS FOR CANADA

USEFUL HINTS.

A correspondent writes suggesting that a patina on copper can be formed by washing it a few times with salt water. This idea occurred to him on noticing the colour of what appeared to be a small copper covered spire, facing the sea, that he saw at Brighton.

A paste with which wallpaper can be attached to wood or masonry, adhering to it firmly in spite of dampness, is prepared as usual with rye flour, to which, however, are added, after the boiling, eight grammes of good linseed oil varnish and eight and one-half grammes of turpentine to every 500 grammes.

A gallon of paint made of finely ground Venetian red mixed in oil will cover one-fourth more (and do it better) than a gallon of paint made of dry Venetian red mixed in oil. It will take much less time to put it on, will wear out less brushes, will wear longer, and hold its color better. Hence, it is perhaps cheaper, as well as better, for all parties to use the article ground in oil.

An excellent effect in burlap decoration, says the Plumber and Decorator, is to hang the burlap on the lower two-thirds of the wall, using a white wall or a large figured paper for the upper third. If the burlap is dark red or green, a black moulding gives a pleasing finishing touch, and a narrow leather gimp, studded with brass-headed tacks and run under the moulding and around the casements and foot-board is very effective.

The weight of a round chimney can be figured by multiplying the weight of a cubic unit of masonry by the contents of the separate drums or shells, each figured by the formula $C=0.7854z\ (D^2-d^2)$. In this expression D and d are the mean inner and outer diameters, z the height of the shell; the thickness of the shell is assumed to be uniform. The weight and surface of architectural additions, caps, cornices and the like are to be neglected.

To Prevent Moisture Striking Through Brick or Plastered Walls.—After a prolonged dry spell, which has given the wall a good chance to dry out, put on a good coat of oil paint, which will soak well into the bricks, then putty up the joints and all the holes that may be in the bricks with glazier's putty stained the color of your paint. When this is dry, give a second coat, not quite as oily as the first and finish off with a coat of flat brick color, or if this is undesirable with a good glossy, oil paint.

For making a sea green shingle stain, the Painters' Magazine advises the use of Prussian blue, Dutch pink and yellow ochre, all finely ground in linseed oil, thinned down to a semi-paste with boiled linseed oil and liquid drier and finally reduced with benzine to proper consistency for dipping. The thinner the stain, the more will it penetrate into the wood. In place of the benzine, or, at least, in place of part of the benzine, creosote or coal tar naphtha may be employed to preserve the wood and prevent fungus growth.

M. Letorey, a French architect, has applied the captive balloon tn the cleaning and decorating of cupolas, high roofs, towers and monuments. The balloon can be raised or lowered from a wagon by a windlass, and it can be steadied by stays from the side of the envelope. It has two platforms, or nacelles, one on the top, the other underneath, and these communicate by a ladder up a central tube. The "balloon scaffold," as it is called, might be useful and safe in many operations, such as now require steeple-jacks, for example, the wreathing of Nelson's column, and also in wireless telegraphy as an aerial.—London Globe.

The base of all hydraulic mortars is lime or the oxide of the metal calcium. Quicklime contains 44 parts by weight of carb. dioxide and 56 parts of oxide of calcium. In slaking 18 parts by weight of water unite with 56 parts of quicklime, making 74 parts of calcic hydrate. The process of slaking is greatly facilitated by the degree of heat generated. Hydrate of lime contains 10 per cent. to 25 per cent. alumina. It differs from quicklime in that it hardens in water and is either argillaceous or siliceous.

A Chicago man who was desirous of escaping the nerve wrecking noises of the city streets, is said to have conceived and adopted the plan of filling all cracks and apertures in the house which might admit sound with a material so constructed as to afford access to air while shutting out noise. The material which the owner says discriminates between noise and air is in the form of strips of rubber, perforated with zigzag holes. Through this the air is admitted, while the noise is softened or completely deadened, the sound waves dying out in repeated reflections in the crooked passages. These strips of rubber have been placed over all cracks around the doors and windows of the house, and two months' experience with the plan has convinced the owner, he says, of its practicability.

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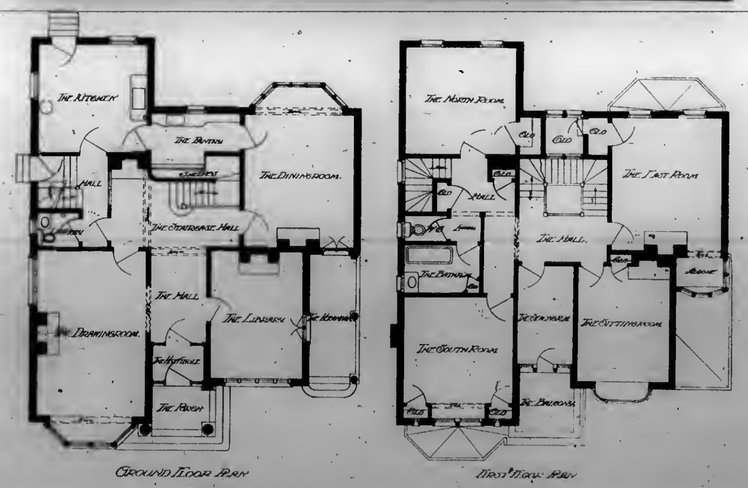

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A Monthly Journal of Modern Constructive Methods,

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The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to foreign subscribers is $2.50. Subscriptions are payable in advance. The Journal will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrears of subscription paid.

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Inspection of Elevators.

A COMMITTEE of the City Council of Toronto has under consideration the subject of the inspection of elevators by the municipality. Considering the number of accidents which have occurred, there appears to be need for such inspection. The number of elevators in use in the city is placed at 1,000 and the number of persons using them at 40,000. Presuming this estimate to be approximately correct, it will be seen how great is the liability of accident if the mechanism of these elevators, and the competency of the persons who may be placed in charge of their operation, is not placed under proper supervision and control.

Soldiers' Memorials.

Fitting public recognition has been made of the services rendered to Canada and the Empire by the members of the first Canadian contingent who recently returned from South Africa. Without doubt a hearty welcome home also awaits the members of the second contingent on their return. But what of the brave lads who laid down their lives in defence of the flag? It is not too early to consider what steps should be taken to express in the form of permanent and suitable memorials the nation's undying appreciation of their valor. While public enthusiasm is aroused as never before in our history, this matter should receive attention. In addition to a National memorial at Ottawa, there should also be memorials erected in the principal cities of the various provinces of the Dominion. Toronto probably could not do better than erect a permanent memorial arch on the site of the temporary one at the entrance to Queens Avenue through which the soldiers passed on their return to the

city. Such a memorial would form a fitting contrast in character to those already placed in Queen's Park to commemorate the death of the volunteers who fell in action at Ridgeway and in the Northwest Rebellion. It would also add interest and dignity to the approach to the Park and Legislative Buildings. The designs for the memorials should be obtained by competition, limited or otherwise, as might be considered conducive to the best result.

German Cement Combine.

FOLLOWING the example of their British confreres, the German manufacturers of Portland cement propose to organize a combine to restrict the output to the average quantity sold during the past three years with a fixed allowance for improvements and for new factories. The present output of the German factories is about six and a half million tons, while the consumption amounts to only four millions. New factories are also being built, with a capacity of two and a half millions. The British, Canadian and American manufacturers are thus likely to be saved from the price-cutting competition which must have resulted from the efforts of the German manufacturers to dispose of their large surplus production in the foreign markets.

Students' Competitions.

ATTENTION is called to students' competitions, particulars of which are printed in this number. The busy season is about to close. The long winter evenings are almost here. The students' opportunity for study and self-improvement is at hand. The student who is alive to his future interests will make profitable use of his time and opportunities this season. It is by placing one's effort's alongside those of others, that one is able to judge of his knowledge, abilities and progress. Every architect should feel an interest in his students. One way of manifesting that interest would be to call their attention to these competitions and encourage them to enter. Will every Canadian architect who may read these lines lend his co-operation in this direction? If so the success of the competitions will be assured.

The Teaching of Drawing.

AMONG the international congresses held in Paris during the last summer was one on "The Teaching of Drawing," which opened on August 29th and closed on September 1st. As the result of a full discussion of the subject, first in separate sections and afterwards in full assembly, the following conclusions were reached. (1.) That drawing should be made a compulsory subject in general education. (2.) That the initiative of the teacher and the individuality of the student should be encouraged to the fullest degree possible. (3.) That the artist and workman should be brought into closer contact by the former devoting greater attention to the requirements of the trade for which he designs and by providing for the latter a more liberal art education. (4.) That the architect requires a more scientific training and the engineer a more artistic training in order that the two professions may work in closer contact with each other.

Opportunities for Trade Expansion.

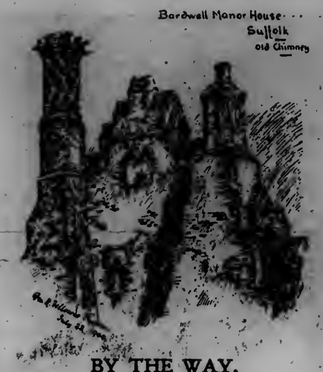
THE return of the Canadian contingent from South Africa reminds us that the war is now drawing to a close and although it may be some time before it is entirely over, trade there is just beginning to resume its former shape. There is little doubt that as soon as security to those commercially engaged can be depended upon, a very considerable expansion in trade may be expected. Tariff rates in the two states which have recently been annexed to the British Empire were formerly almost prohibitive, so that when this new field can be added commercially to that already known in Cape Colony and Natal, the market should be one worth enquiring into. Another change in the Empire is to be made on January 1st., when the Australian colonies are to be federated into one Commonwealth which will necessitate a revision of tariff rates as each colony had its own tariff. It would therefore probably be a suitable time for persons interested in the expansion of trade to enquire into the chances to be found in this field for Canadian products.

Shingles.

It has been interesting to watch the struggle for popular favor between the different varieties of shingles. Our observations lead to the conclusion that the white pine shingle is losing ground, and that its field is gradually becoming more limited. In the western part of Canada, for instance, preference is given to the red cedar shingles, while in eastern Canada the white cedar shingle is largely used. In Ontario the white pine shingle may be said to still hold the market, but even in this province it is meeting with severe competition from other varieties. One of the reasons for this encroachment on the white pine field is the comparatively lower price of cedar shingles. Another reason which has been advanced is that the quality of the white pine shingle is deteriorating, and that even the clear butts sometimes have worm holes in them. It is unlikely that the manufacturers of white pine shingles will endeavor to materially improve the quality of their production, as the high price of pine stumpage makes it necessary to convert into shingles only that portion of the logs which will not make merchantable lumber. It is a significant fact also that the red cedar shingle as now manufactured is a much better article than that which was submitted to the eastern trade a few years ago.

Storage of Explosives.

THE disastrous explosion which recently occurred in a wholesale drug warehouse in New York, has called attention to a source of danger which appears to have been to a large extent overlooked. True, the building regulations of most of our cities contain a regulation prohibiting the storage of any considerable quantity of explosives within specified districts. Such a regulation appears to have existed in New York, but its enforcement was not properly looked after, and the present disaster to life and property is the result. This occurrence should lead to an investigation by the municipal authorities of Canadian cities, to learn if the provisions of the building by-laws in this particular are being observed. The liability of insurance companies for damage arising from explosions of this character also enters into the question. We observe that the standard insurance policy in New York provides that the insurance companies shall not be liable for loss caused by explosions of any kind, unless fire ensues, and in that event for the damage by fire only. The plate glass insurance companies have refused to assume liability for damage to windows within the area damaged by the explosion. It will thus be seen how important are the interests hinging upon the proper enforcement of regulations for the prevention of storage of explosives within the central districts of towns and cities.



BY THE WAY.

THE Assessment Department of Toronto estimates that there are now in that city only 630 vacant houses, and 131 vacant stores, as compared with 3,311 vacant dwellings, and 648 vacant stores in 1896, and that to meet the requirements of population 1,200 houses must be built next year.

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THE multiplicity of strikes and their far reaching effects upon the welfare of the persons immediately concerned as well as upon the industrial progress of the Dominion, necessitates the adoption of legislation which would be effective in putting a stop to this method of settling disputes between capital and labor and such scenes as were recently witnessed at Valleyfield. Compulsory arbitration on similar lines to the New Zealand law seems to be the best solution of the question.

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I AM pleased to note that the teaching quality at the Toronto Technical School is being improved. Mr. Barrett, a capable young architect, was recently appointed instructor in Building Construction. Mr. Banks, whose skill as a modeller is well known in Toronto, has been engaged to give instruction in modelling. If the services of equally well qualified teachers can be procured for the other departments the school may be expected to do much better work in the future than in the past.

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THE authorities of Queen's University, Kingston, have issued an invitation to architects to submit plans and designs for new buildings to cost about $150,000. It contains the usual clause that the said authorities do not bind themselves to accept any of the plans submitted. No provision is made for the appointment of an expert to judge the plans. The matter has been brought to the attention of the Ontario Association of Architects who will try to enlighten the authorities regarding the conditions which should govern competitions of this kind. No self-respecting architect should have anything to do with the competition in its present form.

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THIRTY TWO granite columns each 54 feet long, by 6 feet in diameter, and weighing about 160 tons, are to form a feature of the construction of the cathedral of St. John the Divine, New York city. The rough blocks of granite from which these columns are made, each measure 67 feet long, 8½ and 7 feet cross section, and weigh 310 tons. The corners are roughly dressed off by hand, after which the block is placed in a lathe 86 feet in length, having a swing of 6 feet 6 inches by 60 long, fitted with eight cutting tools, each of which takes a cut 3 inches in depth. These cutters reduce the diameter of the block by 24 inches at one passage over its surface. Six weeks are required to dress and polish each column.

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THE Builders' Journal refers to the foolish custom still prevailing at Freiburg, in Germany, of offering a reward of five shillings and a good dinner to the steeple jack who will climb to the top of the tower of the Minster, a height of 400 feet. This performance forms a feature of the celebration of the birthday of the reigning Grand Duke of Baden. In the ascent the men have to leap from stone to stone, and as the space between these is considerable in some cases, it will be seen what an idiotic practice this is; one miss and the man would be dashed to the ground. When the top is reached a pistol is fired and then the descent is made. Three men went up the tower the other day, and one of them performed acrobatic feats on an iron bar fixed about half-way up.

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THOSE who have studied the methods of the trades unions have noticed that the chief object sought to be attained by them is to secure for their members the highest possible renumeration for the least amount of skill and labor. The working hours have been reduced from ten to nine; again in many cases from nine to eight. This rate of progress is too slow however, for some of the more advanced thinkers on this subject, in which class deserves to rank the Rev. S. S. Craig, a representative of what is called the People's Party. This gentleman in an election address delivered in Toronto, is reported to have said: "He was glad to see the eight hour working plank. But he wanted something more; he wanted a four hour working day and the taxation of land values would produce a four hour working day. Then our wives and our daughters would not have to leave their homes to work for a living, and everbody would have full opportunity for work." Isn't it the opportunity to escape work that is being sought for?

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A GENTLEMAN who has recently visited Sydney, C. B., has been telling me of the wonderful development which has taken place in that town since it became known that the Dominion Steel Company had decided to establish extensive works there. Property which before was considered to be of little value, has enormously advanced in price; indeed it is stated that owners do not apparently know how much to demand, and the prices asked are in many instances ridiculously high. The Bank of Montreal is said to have paid $8,000 for a site sufficient for a new building on one of the principal corners. The number of stores and high class stocks therein is said to be entirely out of proportion to the requirements, as the majority of the new population which has been brought into the town, in consequence of the operation of the steel company, principally consists of the laboring class, whose wages are small and who therefore can purchase only the cheaper class of goods. After a time, when the works are constructed and put in operation, a larger proportion of skilled workmen will be employed at higher wages, but even then it is considered doubtful if many of the new establishments which have been started will find it possible to do a profitable trade.

The Keizer Brick Machine & Mfg. Company, of Winnipeg, are applying for incorporation.

ARCH OF TRIUMPH, PARIS.

CANADIAN SOLDIERS' MEMORIALS.

By request a number of gentlemen prominent in artistic, military and business circles have kindly sent us a brief expression of their views in regard to the desirability of immediate action being taken to erect suitable memorials to the memory of the Canadian soldiers who fell in defence of the Empire in South Africa. These opinions are appended as follows :

GENTLEMEN,—I have your valued favor of Nov. 8th and have read the accompanying proof of the proposed article in relation to a Memorial of the participation of Toronto in the South African War, and in reply have to say that I think it is desirable that while the public is alive to the question, some means of recognition should be adopted. Your article doubtless will provoke discussion, and enable those interested to form a better opinion than could be done off hand without greater consideration than I have been able to give to the question.

It has occurred to me that the men who sacrificed their lives in this War, should especially have recognition, and whether the Arch is erected or not, the portraits of these men who went from Ontario, should be placed in the Parliament Buildings.

I know that in some cities of the United States, the representatives who perished in the War of the Rebellion, have been honored in the way which I have indicated—thus, in Harvard College there is a Memorial Hall devoted entirely to this purpose.

Yours very truly,
EDWARD GURNEY.

SIR,—Replying to yours of yesterday's date, I quite approve of the "Soldiers' Memorial" exactly on the lines that you suggest. I think it is the duty of the citizens of Toronto to in some satisfactory manner permanently commemorate the men who went to South Africa, and I think no better form could this memorial take than a permanent archway where the temporary one was erected at the end of Queen Street Avenue. Appreciating the honor you do me in asking my opinion, believe me,

Yours truly,
JOHN I. DAVIDSON.

Toronto Nov. 10, 1900.

DEAR SIR,—I was very pleased to receive a few minutes ago, your circular letter respecting a permanent arch to be erected in Toronto as a fitting recognition of the services that Canada's sons have rendered to the Empire. I would suggest, however, that a better and safer location than the one you mention would be at the College street end of the avenue. Queen street being such a thoroughfare, I fear the same difficulty in preserving it would occur as what happened to the fence around Osgoode Hall, where every corner of the stone pillars was broken off by hoodlums loitering around in that vicinity. I think the arch should be of substantial stonework, and as it would be at the very entrance of Queen's Park, that a statue of Her Most Gracious Majesty, the Queen, should adorn the top of the arch. I am quite sure if the ladies of Toronto would take this matter up, they would carry it through to a successful issue, as they have never yet failed in any undertaking of a loyal and patriotic nature. Wishing you every success and assuring you of any assistance I can possibly afford,

Yours faithfully,
J. M. DELAMERE,
Lieut.-Col. Com. Q.O.R. of Canada.

GENTLEMEN,—Replying to your letter of the 8th inst., enclosing copy of article referring to a suitable memorial for our Canadian boys who have died for the Flag in Africa, I would say that I am in sympathy with the idea, and think that some recognition should be made in the shape of a memorial in the Queen's Park. They certainly have done their duty well and faithfully, and we are under a deep debt of gratitude to them.

Yours faithfully,
A. E. KEMP.

DEAR SIR,—I am heartily in accord with the proposition to erect a memorial to those Canadians who gave their lives for the cause of freedom in South Africa, and as a Canadian artist I am jealous that the memorial shall be a fitting tribute in its aspect as a work of art. I approve of obtaining designs through competition, but only on condition that a competent jury is appointed to decide on the merits of the designs. The Toronto Guild of Civic Art is organized for the purpose of arranging such matters, both as to how designs should be submitted and the appointment of fit persons to pass judgment upon them, and I hope the arrangement of the purely artistic portion of the work will be entrusted to that body. I would suggest, as a practical step to take, that the Guild be asked to look into the matter, and prepare several alternative schemes with the approximate cost of each. Speaking as a member of the Guild, I believe immediate action on their part would result from such an invitation from the Red Cross Society, who have initiated the idea.

Sincerely yours,
G. A. REID.

INDIAN ROAD, TORONTO, NOV. 13TH, 1900.

DEAR SIR,—I wish to assure you of my sympathy with your proposal to erect a memorial to members of the Canadian Contingent who fell in South Africa. Some memorial should be erected and it is time now to make suggestions. But as regards the especial memorial you propose—an arch over Queen's avenue—I hesitate to express unqualified agreement. If it were intended to raise a memorial to troops returned from victory, such an arch as they might march under on the day of their return would be a suitable memorial; the present custom for temporary decorations and precedent for permanent structures suggests it. But as an erection in honor of the dead, it seems, whether innately or from custom, inappropriate.

I offer this criticism of the particular proposal made, but hope, and indeed cannot doubt, that the general idea will meet with approval from everybody.

Yours truly,
W. A. LANGTON.

94 KING ST. WEST, TORONTO, Nov. 12th, 1900.

DEAR SIR,—I think the proposal to erect a permanent memorial to our Canadian Soldiers on the site of the temporary triumphal arch is a very good one.

But I hope if this work is undertaken at all it will be done as well as they did their's.

An important opportunity like this of permanently recording a great event in our country's history should be thought out as well as we are able, so that there will be no risk of belittling either the deeds of our soldiers, or a site so valuable with a mean erection.

The Guild of Civic Art was formed I believe to advise upon these matters and I hope they will see that the project is dealt with in a large enough manner, and not leave us with a monument like something adrift from a graveyard.

Yours truly,
EDEN SMITH.

CANADA LIFE BUILDING TORONTO, Nov. 13th.

DEAR SIR,—I have read your suggestion that an arch should be erected at the foot of Queen's Avenue to commemorate the bravery of the Canadian troops in South Africa. I heartily approve of the suggestion. The co-operation of the colonies with the mother land marks clearly an epoch in our history, and no more appropriate form of monument could be erected than an arch. The position is an admirable one, and I think the Ontario government should unite with the city in erecting an arch that would reflect credit on our country and city.

Yours truly,
JAMES L. HUGHES.

TORONTO, Nov. 13th, 1900.

GENTLEMEN,—I duly received your favor enclosing a circular with reference to the proposed memorial to those of our volunteers who were killed and wounded in South Africa.

I agree with your idea that a permanent memorial arch should be erected on the site of the temporary one at the entrance to Queen's avenue, and shall be pleased to subscribe to a fund for that purpose, providing the matter is dealt with promptly.

Yours truly,
J. O. THORN,
Honorary Captain, Quarter-Master, 2nd Regiment
Queens' Own Rifles of Canada.

TORONTO, ONT. Nov. 14, 1900.

DEAR SIR,—Our society having heard from Mr. Reid, our President, of the intention to erect an arch to commemorate the death of our soldiers who fell in South Africa, heartily endorse the suggestion, and would advise that all our architects and artists be invited to send designs, and that judges appointed by the Guild of Civic Art select the most artistic and suitable for the purpose.

Yours truly,
ROBT. E. GAGEN,
Secretary Ontario Society of Artists.

TORONTO, Nov. 14, 1900.

DEAR SIR,—Relative to your suggestion regarding a memorial to be erected in honor of the brave Sons of Canada who have laid down their lives in defence of the Empire in South Africa, I think there cannot possibly be two opinions upon the advisability of erecting some permanent and suitable monument in recognition of their services.

What is done, however, should be done well. The monuments now existing in Queen's Park commemorating the death of those who fell at Ridgeway and in the North West Rebellion, are not, in my opinion, worthy of the deeds which they commemorate. Any monument which may be erected to the memory of those who fell in South Africa should be one in which we can always take a pride in pointing to. I think the suggestion of an arch, at the entrance to Queen's avenue is a good one, and it would add, as you say, interest and dignity to the approach to the Park, as well as commemorate in a most fitting manner the services of the Canadians who fell in South Africa.

Yours truly,
W. C. MACDONALD, Lieut.-Col. 48th Highlanders.

TORONTO, Nov. 14, 1900.

Honor the brave! Who desires to do otherwise? But in taking steps to perpetuate the deeds and memory of Canada's brave sons, let us not be carried away by sentiment, as the stern, stubborn facts of ways and means will confront us sooner or later.

All honor to the Red Cross ladies who are desirous of erecting a memorial arch in College avenue, as to which, the suitability and site, there would likely be little contention if we were assured that the amount required would be forthcoming, and the result be satisfactory. Let us not attempt too much for fear we fail. Past experiences should make us cautious. How much are we prepared to expend and what we are likely to accomplish, should be our first consideration. If we find a memorial arch is out of the question why should not the City Hall be the receptacle of a bronze Commemoration Panel, or one in relief, or of a piece of statuary. In mentioning the City Hall as a suitable place, might we not look forward to this building becoming the treasure house of such mementos as we may erect from time to time, either in marble, stone or bronze, a building visited by thousands of tourists annually, and a building so well adapted for the purpose.

There is no doubt that if anything is to be done now is the time, and why, I might ask, should this not be a Provincial monument? The position of Toronto is central, and the site most desirable, whether in or out of doors. Toronto, no doubt, will contribute most of the funds, but other sections of the Province should not be debarred from contributing their quota to a monument in which they are as much interested as ourselves.

R. Y. ELLIS.

TORONTO, Nov. 1, 1900.

"From the earliest times to the present day the deeds of kings and heroes have been recorded in arches of stone. The Propylea at Athens, the arch of Constantine at Rome, the arch of Triumph at Paris, the Washington arch in New York, and the marble arch in London are familiar examples of this fact. These memorials have been the means of perpetuating the memory of men and events which would otherwise have passed into oblivion. Such commemoration, recording the gratitude and appreciation of the nation, incites to great deeds and emulation in those living and in generations yet unborn. These memorials fix in the mind the sacrifices of a people on the altar of patriotism as nothing else can. They become objects of patriotic pilgrimage, and from them emanate influences which contribute to the fostering of national ideals which make for the upbuilding of the nation.

Canada has taken her place among the nations of the earth, and has demonstrated that she is an integral part of the British Empire. Shall we not record the deeds and the daring of her gallant sons? Shall we allow the names and the sacrifices of our fallen comrades to be forgotten? They have not died in vain, for their blood has cemented the structure of the British Empire.

The city of Toronto, as becomes the capital of the great province of Ontario, is adorned with statues and memorials of Ontario's illustrious dead. Shall we not rise equal to the importance of the occasion and erect a Provincial Arch of Triumph to her victorious sons, and to record for all time the names of the gallant dead who fell in the defence of the Empire and in the sacred cause of civil and religious liberty in South Africa.

I propose the formation of a committee to be composed of representatives of the Red Cross Society, National societies, the military element and representative men in Ontario to take the matter up and bring it to a successful issue.

G. STERLING RYERSON.

DEAR SIR,—In reply to your article re Soldiers' Memorial, I agree that some steps should be taken to express our gratitude for the sacrifice those brave boys made in giving up their lives for our country, and no more fitting monument could be erected to their memory than a permanent arch at the entrance to Queen's Park avenue.

I would therefore suggest, if this idea finds favor, and it surely must, that the architects and artists of Toronto be requested to

submit designs (with specifications as to cost). These designs to be placed on exhibition and competent judges appointed—judges above approach and reproach—to select the best and most suitable one. Then a fund might be started by the citizens to defray expenses.

Yours truly,
McGILLIVRAY KNOWLES, R.C.A.

DEAR SIR,—I regret that owing to press of business I have been unable to answer earlier your letter of 8th inst. I sincerely hope that an enduring monument of some character in honor of the work of the Canadian Contingent in South Africa will be erected, but I should regret if it took the form of an arch unless a large sum of money, somewhere between $25 and $50,000 could be raised, which I think is out of the question. In any event I do not think that an arch at the entrance to the avenue in question would be desirable. A bronze statue in the uniform worn by the Canadian Soldiers in South Africa would, in my opinion, be much more readily accomplished in view of its cost.

Yours truly,
B. E. WALKER.

TORONTO, November 17th, 1900.

Dear Sir,—I am much obliged for your letter of the 8th, instant with accompanying proof of the article which is to appear in the November number of the "Canadian Architect and Builder." I am quite in accord with the suggestion made therein and am glad to observe that a movement is already on foot in Halifax for the perpetuation of the memory of our soldiers who fell in South Africa, by some fitting memorial.

Yours very truly,
F. W. BORDEN.

Ottawa, 19th November, 1900.

ARCHITECTS' AND ENGINEERS' NEW ROOMS.

The Ontario Association of Architects from date of 15th Nov., are going to have a local habitation, in pursuance of plans laid before and endorsed by the last convention. The second floor of Nos. 94 and 96 King street west have been rebuilt by Messrs. Darling & Pearson, and adapted to the requirements of architects' and engineers' association rooms—to be used for the furtherance of the interest they have at heart—the personal intercourse, interchange of ideas, and criticism of methods, which makes for that atmosphere in relation to these matters which mark the larger centres, which broadens and refines as opposed to narrowing isolation.

The entrance from the street is not all that was promised. Existing leases prevented the carrying out of the terra cotta front for the present, but passing through a massive oak door and ascending an oak stairway, at the landing is entered the lobby, or ante room, common to both engineers and architects. This is an effective square hall, twenty feet wide with unique prismatic ceiling light. The woodwork, including impost of large cove to ceiling, is all white, excepting a tint on the cove, a strikingly effective wall paper in green and blue, yellow, and red mahogany doors, with old brass furniture. From this ante room (which is to be furnished as a comfortable common meeting ground or 20x40 feet; architects' room, 20x20 feet; Engineers' room, 20x19, all members) are five doors, giving access to assembly room, a lavatory filled up in marble; a cloak room with sink and gas range, and large enough on occasions for serving luncheon or dinners. The assembly room will seat 125, is finished in white enamel, except high dado of sheeting covered with crimson burlap for tacking up drawings on exhibition. A raised dais and blackboard marks the speakers' end. The ceiling is a segment of a circle supported by heavy cambered beams.

The architects' special room has three windows looking on to King street; it has a great mantel, a book case with leaded glass doors, a fixed seat and desk, shelf and picture mould carried entirely around the room, giving continuity to the whole effect. The finish of woodwork is an antique green stain, harmonizing with reddish brown wall paper of bold pattern. Massive oak table and chairs, chosen for comfort most of all, black iron dogs set in brown tile hearth, with Turkish rug on the floor and warm curtains on the windows, completes the furnishing of the room.

The lighting of the entire floor is by electricity and is made very effective, especially in common lobby with its eight ceiling drops.

The members are earnestly urged to make use of the rooms on all possible occasions. The furnishings are not yet complete, but it is the intention that their homelike character will make the rooms a congenial place of meeting—to have on their tables and shelves such periodicals and books as will illustrate the world's architecture and art, and keep the members in touch with it.

Branch Office of the CANADIAN ARCHITECT AND BUILDER,
Imperial Building.

MONTREAL, November 16th, 1900.

CANADIAN SLATE.

Since 1893 the production of slate in Canada has gradually been decreasing, and one by one the different quarries have closed down until now there is not a slate turned out in the whole Dominion. This regrettable state of affairs was brought to a climax last May when the quarries of the "New Rockland Slate Co." were shut down. Their quarries have been the only ones working for the past two years, and as the slate turned out has almost invariably been of a uniform good quality, it is with regret that we draw the attention of our readers to the fact, and trust that soon we may hear of their starting work once again. These quarries are situated in that portion of the Province of Quebec commonly called the Eastern Townships, and have given employment to over 80 hands almost continuously since their first opening in 1864. In 1882 the company re-formed under new management, and in 1886 constructed a tramway to connect the quarries with the Grand Trunk Railway, a distance of over four miles.

The United States has recently opened up quite an extensive export trade both with Great Britain and Australia, and it is a great pity if this field for slate cannot be held in the near future by Canada.

The United States in 1898 produced for home consumption slate valued at $2,353,465, and exported $1,370,075 worth, of which $1,213,377 went to great Britain. Surely this market is worth gaining.

There have been some improvements in slate quarrying of recent years, chief and foremost being the use of the channeler, a machine which takes the place of blasting—a process which has always been more or less objectional as it shatters and wastes a good deal of otherwise good slate. The slates from the Rockland quarries have always worn well and have proved of superior quality, and compare most favorably with the best Welsh and Pennsylvania slates. The chemical composition is as follows:

Silica S_1O_2	65.39
Alumina	15.97
Ferrous Oxide	4.66
Lime and Magnesia	3.66
Potash and Soda	6.93
Maryonous Oxide	0.39
Loss by Ignition	3.26
	100.26.

This analysis shows at a glance how rich the Rockland slate is in the valuable constituents of a slate, viz., the silicates of iron and alumina, and if sufficient slate of the highest grade can be found, we can see no reason why an export trade could not be obtained both with Great Britain and Australia, and also probably South Africa.

FIRE-PROOFED WOOD.

The Electric Fire-proofing Company are at the present time erecting buildings near Montreal in which wood is to undergo a process whereby it will become non-inflammable. The result is obtained by forcing sulphate and phosphate of ammonia into the wood by hydraulic pressure, and has been found very satisfactory in so far that the wood only carbonizes and fails entirely to ignite. This non-inflammable wood has been used to a large extent on nearly all the more modern U. S. warships, and in a

report from the Naval Constructor to the Secretary of the Navy in March, 1899, he says, after testing for eight months: "That so far as is known there is no better process of fire-proofing wood in use than that now employed by the Electric Fire-proofing Company, and its continued use, for the present at least, is advised."

The science of fire-proofing has of late years been carried to a point not dreamt of ten years ago, and at last architects are beginning to understand that no structure should be called fire-proof unless it is so in every respect. It is almost as sensible for a farmer to build a fence and have the gate open as for a man to build a large building only partly fire-proof. Architects should be more careful of their reputation than to allow a building not completely fire-proofed to be designated a fire-proof structure. Only a small portion, the underside of a steel beam or a single column, unprotected, might cause serious loss to almost the whole building. This fire-proofed wood forms the last thing necessary in fire-proof materials, as there is brick and terra cotta for the walls, porous terra cotta and concrete for the floors and partitions, encasing steel if necessary, and now there is non-inflammable wood for doors, sashes, and fixtures. These materials if employed in a scientific manner, ought to make a completely fire-proof structure, that is, one that is capable of standing a severe fire and water test.

OBITUARY.

One of the landmarks of the building industry in Montreal has recently been removed in the person of the late Mr. Charles Sheppard, whose portrait accompanying this article will be re-

THE LATE MR. CHAS. SHEPPARD.

cognized by a wide circle of acquaintances. Mr. Sheppard came to Montreal in 1860 and entered into co-partnership with Mr. Henry Bulmer as manufacturers of building brick. They acquired large tracts of land in the east end of the city, and from a modest beginning their establishment grew to be the largest and most extensive of its kind in the Dominion. The firm of Bulmer & Sheppard continued until 1885, a period of twenty-five years, and then Mr. Charles Sheppard purchased Mr. Bulmer's interests, carrying on the business alone until failing health about three years ago decided him to retire from active pursuits. Since that time his two sons, George J. and Edmund, both well known to the community, have conducted and succeeded to the business. Mr. Sheppard passed away on the 12th of October, leaving a sorrowing widow (who had but a few short weeks before celebrated the anniversary of their golden wedding) and his two sons.

His death removed from amongst us one more of the staunch men of the old school—a man of honor and probity. One of the most touching tributes to his memory was a handsome pillow of flowers which his numerous employees placed upon his grave, bearing the inscription "Le Maitre." Mr. Sheppard was always ready, in an unassuming way, to assist the needy, and an appeal to him always met with a substantial response.

THE GRANBY ENAMELWARE CO.

The popularity of porcelain enamel iron for all sanitary ware has tempted the Granby Enamel ware Company, of Granby, Que., to start manufacturing enamel baths and sinks. The first baths turned out were slightly defective, both in the flow of the enamel and also in the finish to the edge of the rim, but in the baths now turned out these defects are being overcome. The market for these goods is very extensive in Canada, and we wish the company success in their venture, they being the first as far as we are aware in this line. We trust that the firm will bear in mind that it is indispensable to success that every detail should be carried out with the greatest care, and that no defect should be found in their first quality goods. It is often what may appear a trifling blemish that is the cause of dissatisfaction, and this soon ultimately turns what might have been success into failure.

MINES OF THE PROVINCE.

The following is a summary statement of the yield of some the mines in the Province of Quebec for 1899, that may be of interest.

Nature of Material	No. of Men Employed.	Gross Value.
Bog iron ore	800	$40,000
Asbestos	900	581,667
Asbestic		17,069
Slate	75	30,119
Flagstones	9	3,500
Granite	60	14,780
Cement	50	31,130
Lime	250	140,000*
Bricks	1200	600,000*
Building Stone	350	250,000*

*Estimated.

The asbestos came chiefly from Megantic and Richmond Counties, the slate from New Rockland, (the quarry at that time was working), flagstones from Dudwell, granite from Stanstead, where there are three quarries, and from St. Philippe, where the Laurentian Granite Company's quarries are situated. There is also work started at Mount Johnson, in Iberville County, where a dark grey granite of good texture has been found. The cement came from Hull and Longue Pointe near Montreal, while the bricks came chiefly from Montreal, Laprairie and St. John Deschaillons.

THE P. Q. A. A.

The Province of Quebec Association of Architects will have a special general meeting on the 15th of January, 1901, in Montreal. Object: Amendments to by-laws and election of an auditor to replace Mr. C. Dufort, who is now a member of the council. Members wishing to amend any article of the by-laws should send in their proposal of amendments to the secretary before the 15th of December next.

THE NELSON MONUMENT.

This monument, erected nearly a century ago to commemorate the battle of Trafalgar, has recently undergone repairs, under the direction of the Munisinatic and Antiguarian Society, and thus restored, was recently unveiled by Lord Strathcona.

NOTES.

Mr. James Ballantyne, the well-known plumber, has recently admitted to partnership Mr. R. F. Oilvy, under the firm name of Ballantyne & Co.

A memorandum recently found in the desk of ex-City Building Inspector Lacroix is said to prove that he retained over $7,000 in fees for building permits, which should have gone into the city

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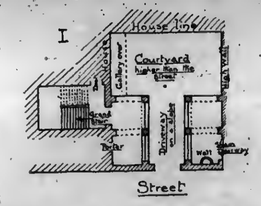
DECISION OF AN IMPORTANT COMPETITION.

Last year the corporation of the town of Levis, province of Quebec, advertised for competition plans to be submitted by civil engineers for the best system of "Waterworks," and "Sewerage" for the town of Levis. Recently the judgment has been given in an elaborate report which indicates a careful and conscientious study of the different plans submitted. The judges were, Charles Baillairge, ex-engineer for the city of Quebec; Chas. E. Gauvin, C.E., Quebec, and Jeremiah Gallagher, C. E., director of Waterworks, city of Quebec, who have awarded the first prize of one thousand dollars to Robert Surtees, C. E., Ottawa, and the second prize of five hundred dollars to Messrs. Berlinguet and Lemay, architects and civil engineers, Quebec.

The parlor of a suburban house is hung with a pale green paper having conventional figures in pale ivory of flambeaux surrounded by garlands powdered regularly upon it. The heavy curtains that separate this room from the hall are dark green velours, through which the dull red finish of the plastered walls in the hall forms an agreeable color contrast. On the parlor floor is a heavy Wilton carpet of a floral pattern, roses on a green ground, while an Oriental rug is thrown on the polished floor in the hall. The furniture is of forest green oak in the quaint style, delicate in outline yet picturesque in form. The upright piano, in a case especially designed to correspond with the other furniture, is also forest green oak. In the hall, Flemish oak has been used for the chairs and the table and mirror frame, a pair of stag horns serving as a hat rack. A tall clock in one corner of the hall is cased in Flemish oak.

SELF CONTAINED HOUSES.

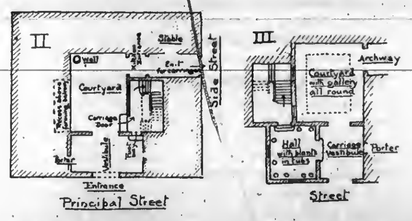
A WALK through the streets of a French or Italian town interests the imagination more than a similar excursion among the rows of houses in an English or American city where ground is precious. Everything is to the front with us. We live on the street, and even in our detached houses there is little in the block plan of the house which is of interest to the dwellers in the house which is not also in evidence to the passer-by. It is different in the southern countries of Europe. Here the highest ideal in domestic architecture is that a house should be self-contained. The more pretentious the dwelling the more it turns its back upon the street and



expands towards internal courts and gardens, free from observation, free from noise, dust and glare; and, though in the south of Europe they are apt to court shade, the same mode of planning can—which interests us most—be made to invite the sun by avoiding a look-out to the north.

The interest of the streets is increased rather than lessened by this method of building, for there is still a façade in most cases; only, instead of a flight of steps there is an archway, of which the gate usually stands open, affording glimpses of interior courts which appeal not only to the imagination but to the eye, as picturesquely diversifying the monotony of street scenery.

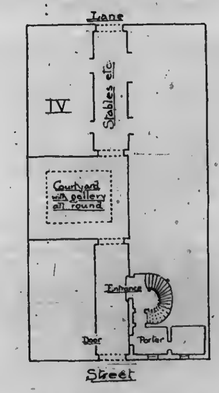
Verona is peculiarly rich in the variety of prospect thus afforded as one walks the streets. The first six plans here shown were hasty sketches made to note merely variety of entrances in that city; but there are added notes of such other keys to the plan as were



apparent to an unobtrusive observer, and the general scheme of the house is fairly clear.

No. I is obviously an interesting peep to the passer-by, as seen through the 8 or 10 foot archway. There is room for much perspective effect in the three lines of arcading backed by the open court beyond. The variety is enhanced by the fact that the driveway slopes and that the steps underneath the arches differ in number The stair is seen through an open archway beyond. There is usually no door to such a stairway; indeed there is no object in having a door for the porter is on guard, there is no exposure to the weather, and in winter the temperature out of doors is milder than that in the house. In an inn the formality of a door even at the top of a stair is often dispensed with; every man's room door is in direct communication with the street. By dint of an open fire place or a cement stove he maintains a little fortress of warmth against the cold world without, and his boots which have lain the night in the icy corridor outside are cold indeed when he takes them in again in the morning. This plan is one of the simpler arrangements; the house surrounds the court yard only on three sides, and there is no exit but the entrance, so that carriages must turn in the court and come out as they went in. The resident of a house of this description would be surprised if asked to step 5 feet across the sidewalk to his carriage, and no doubt would be astounded if he saw some of our good houses where the extent of slat walk to be traversed to get to a carriage on a rainy night is nearer 50 feet than 5.

No. II shows a larger plan in which the house surrounds the court and there is an exit to a side street. Indeed self-contained houses are usually to be found upon a corner lot where they get the advantage of a side street for the second entrance. It would perhaps be better to call this a second exit, for it is usually kept closed except on occasions when there is a procession



of carriages. Tradesmen evidently use it also in this case, as the kitchen entrance is at that point.

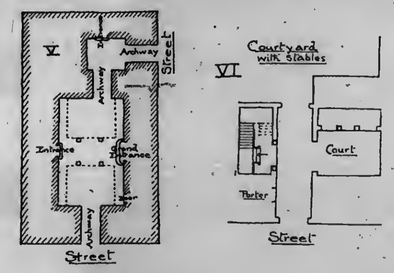
No. III appears to be the entrance of a very handsome house which has not only the second front and exit, but gets light for the hall and staircase by a return on the main front. The hall with plants in tubs makes a beautiful approach to the stairway. There is recorded in the sketch book from which these plans are taken a note upon the effect of trees or shrubs set out in a court yard with the gloom of an arcaded recess behind them. The view from the street through the hall to the staircase is probably intentional as the door to the hall from the vestibule is much larger than is necessary to mate the second door leading to the staircase, but its size just suits the needs of the raking view. The three steps at the staircase door are well placed to add interest to the vista.

No. IV is chiefly interesting as a variety of plan in which the driveway runs through the block. The distance from front to rear, measured approximately by pacing, was 130 feet. The wall on the right gives in plan a long drawn out appearance to the driveway which does not appear in execution, when the archway in the rear is seen as a distant object separated from the first archway by a field of light. The archway is 12 feet wide and the façade about 65 feet.

No. VI has a long archway, but a small court on the right admits light just at the doorway and breaks up the tunnel-like appearance that the archway would otherwise have. The absence of any probable utility for the shallow colonnade on the far side of the court and the fact that it is on the side where it will be seen, suggest the supposition that it is there for that purpose—to further relieve the monotony of the entrance.

No. V is a palace, dated 1668, in which a large court is obtained without much loss of room for the dwelling, by carrying the upper structure across the court on columns. There is plenty of room to drive between the entrance and the next pair of columns, and the height of the superstructure is about 20 feet. The main mass of building is evidently one room deep—room opening into room no doubt in the manner of the time—but passage ways are provided by carrying enclosed galleries, as shown by dotted lines, from the front and back parts of the building to the central portion which rests upon the columns.

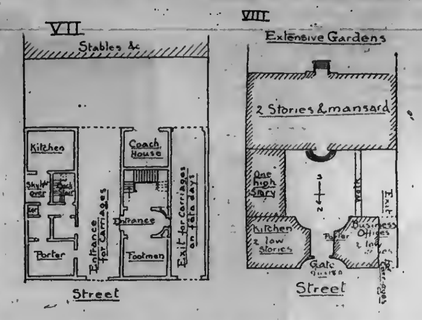
No. VII shows a Parisian residence of the best class. Here as is common in Paris the second driveway opens on the same street as the grand entrance, but there is no danger of confusion; the entrance is more imposing than the exit and the latter is kept closed except on state occasions. The house of course extends over both



openings, the full width of the lot. This is a plan for a building site which runs only to the middle of a block. If the block is shallow and the site runs through to the other side it seems to be preferred in Paris to place the the stables at the entrance and the house on the other street with its front inwards towards the court. There is none of our abhorrence of stables, and no doubt the stables are so well kept that there is no cause for abhorrence. The smaller class of houses, which have no stables and not even an entry for carriages, still make the most possible of the inside of the lot. A Parisian house of modest pretentions still attains to the dignity of facing upon ground of its own by maintaining a garden behind upon which some of the principal rooms look and where the freedom of low windows and an external verandah or gallery of some kind may be enjoyed.

No. VIII represents the British Legation at Paris, which extends entirely through a deep block so that it has not only a handsome entrance front and court but, in the true palace style, a more imposing front looking south upon a garden with no limit but a distant street. This is a splendour so remote from every-day life as to chill interest, but it is wholesome to enjoy contemplating the great problems for they do come occasionally and are apt to be abused from the very habit of not rising above the ordinary.

No. IX, which is the residence of aristocracy in a country town, is perhaps more like the sort of large treatment that would suit our needs. It is a model of quiet dignity. The front, somewhat important from the arrangement of its parts, though quite plain, has the entrance court to itself. A little lower and a little withdrawn is the service department looking into the service yard, which a lofty iron fence, like a rood screen, cuts off, while adding to rather than detracting from the

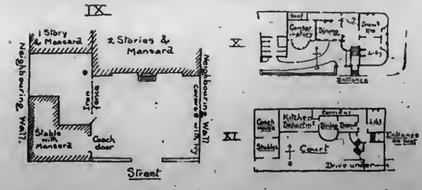


effect of its space. No doubt there is a garden on the other side of this house.

It is interesting to find that the principle of self-contained house planning was adopted by H. H. Richardson in two large houses in Chicago, shown in Nos. X and XI. Both these houses stand on corner lots. Mr. Glessner's house, No. XI, is an obvious case of getting a south aspect for a house which would, if facing the street, look north and east. The east aspect has been preserved for the library and a bedroom over the driveway, but the other rooms are made to face inwards to the court and the sun, while the street front is occupied in the most marked manner by a corridor.

In No. X, a house for Mr. Franklin McKeagh, the lot is a corner lot facing south and east so that the recess in plan does not alter the exposure but is designed for its own sake; for the advantage of a certain retirement from the street and for the increased exposure to light on the front side.

It is worth noting in conclusion that a study of foreign plans of this sort shows what a gain it would be



to the plan, how much more freedom we should have in using both fronts for living room purposes, if custom allowed the kitchen department to be put in the basement.

W. A. LANGTON.

Five bronze tablets have recently been placed in the entrance to the Massey Music Hall, Toronto, in memory of the founder, the late Hart. A. Massey, and his eldest son, Chas. A. Massey.

An historical tablet has recently been placed by the Canadian Club on the site, at No. 191½ King street west, of the Home District School, the first building used for school purposes in Toronto.

METHOD OF HOISTING A SET OF LARGE BELLS.

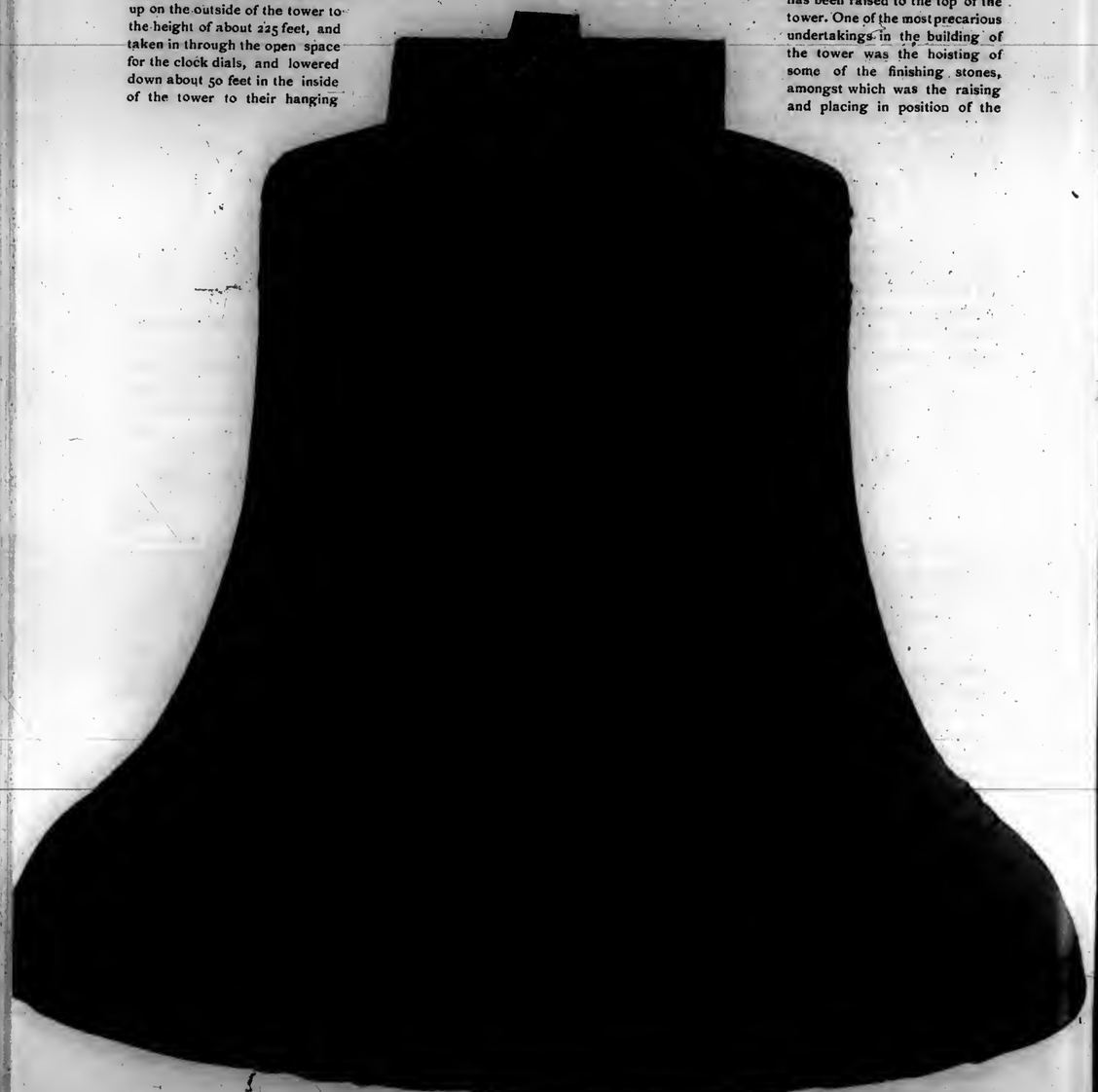
TORONTO, Nov. 18th, 1900.

Editor CANADIAN ARCHITECT AND BUILDER.

SIR,—In answer to your request for information and a description of how the bells are to be hoisted into place in the tower of the New City Buildings, Toronto, I send you the following memos and accompanying section and plan to better illustrate my description.

There are to be three bells; the largest weighs 12,000 pounds and the other two 3,000 and 2,000 pounds respectively.

The bells have to be hoisted up on the outside of the tower to the height of about 225 feet, and taken in through the open space for the clock dials, and lowered down about 50 feet in the inside of the tower to their hanging position, which will be about 6 feet above the sills of the large open belfry windows.

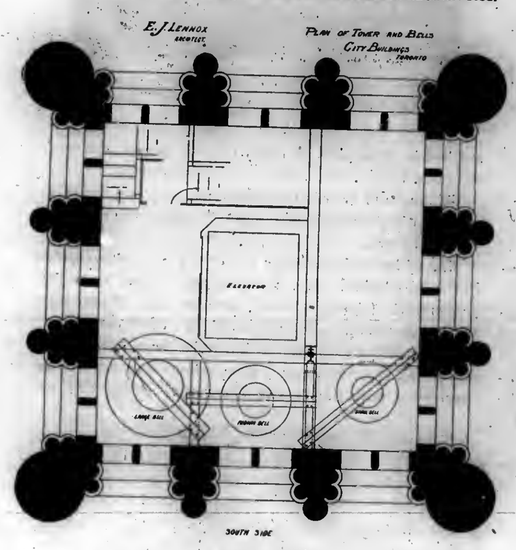


THE LARGEST OF THREE BELLS TO BE PLACED IN THE TOWER OF THE NEW MUNICIPAL BUILDINGS, TORONTO. HEIGHT OF BELL, 6 FEET; DIAMETER, 6 FEET 8 INCHES; WEIGHT, 12,000 LBS.

In arranging for an undertaking such as the hoisting of these bells, (especially the large one), quite a problem had to be faced, for it must be borne in mind that it is a very unusual undertaking, if, indeed, it ever has occurred before that a bell of the weight of the large bell, viz., 12,000 pounds, had to be hoisted up on the outside of a building to the height that this bell has to be hoisted, before it could be delivered down into its resting place. All this trouble and expense is incurred for the reason that the contract for the clock and bells was not let in time so that other provisions might have been made for the placing of these bells. I do not, however, fear for the success of the undertaking.

I would also draw your attention to the fact that when the large 6-ton bell is hoisted it will not have been the heaviest load that has been raised to the top of the tower. One of the most precarious undertakings in the building of the tower was the hoisting of some of the finishing stones, amongst which was the raising and placing in position of the four large Gargoyles, each of which weighs 14,000 pounds, and when placed project out 9 ft. 6 in. beyond the face of the angle buttresses of the tower, and tail in on the wall about 6 feet, making the total length about 15 feet. But in the hoisting of the gargoyles I used the derrick and tackling that I had especially designed and constructed for the purpose of carrying on to completion the construction and finishing of the tower. I merely mention the fact to show that the weight of the large bell is not to be feared in connection with the hoisting, but the great difficulty is in having to undertake the hoisting of such a weight as this with appliances and tackling that can only be temporarily erected for the purpose. After a good deal of consultation between the clock and bell contractor's foreman, and sub-contractor, who has undertaken the contract to hoist the bells, and myself, the following plan has been decided upon:

At the top of the tower opposite the south dial will be erected a shear-legged derrick firmly planted on heavy timber base, on projecting ledge of tower, and anchored in at foot so that it will not shear out, but so formed that it will not retard the inward movement of the derrick. The head of the derrick will hang out from the face of the tower far enough to allow the bell to be hoisted clear of all projections. At the head of the derrick will be fastened the hoisting sheave rigged up with two ⅝-steel wire cables, each capable of sustaining 10 tons. These cables will extend from the top of the bell while on the ground, up to the hoisting sheave and down to the drum of the hoisting engine which will take in the slack. The top of the derrick will be anchored back at head to keep it in its outward hanging position. To the head of the hoisting derrick will be fastened another steel wire cable brought back into tower through sheaves and down to a crabwinch; this cable will be used for drawing in the head of the derrick. At a few feet below the level of the height that the bells are to be hoisted up to, before they are hauled into the tower, will be a strongly constructed, projecting platform erected to receive the bells. The platform will be anchored back into tower, projecting just far enough so that the bell when being hoisted will pass quite close to the edge of same. There will also be properly rigged-up on the inside at the top of the tower a hauling in hemp cable, capable of sustaining at least a weight of 10 tons. On the ground at the foot of the tower will be erected a steam hoisting engine and drums.



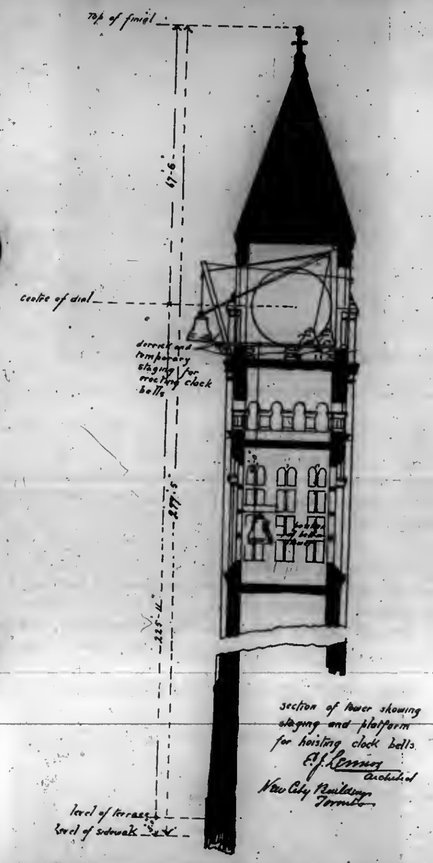
The process of taking up each bell will be, that it will be hooked on to the hoisting sheave at end of cable hanging down derrick and steadily and carefully hauled up by the hoisting engine until it reaches a height of several feet above the level of the projecting platform. Then the head of the derrick will be hauled in until the bell hangs over the platform, when it will be gently lowered down on to rolling skids, and pinched into the required position.

The bells having reached this position it will be an easy job to lower them down into their place with overhead tackling hung from beams in the top part of the tower; they will then be blocked up into position until they are bolted up to the heavy framework of steel beams, when blocking will be removed and they will hang clear fastened to beams.

In conclusion, I might say that every precaution is to be taken; the scheme has been carefully thought out, and I have no reason to think other than that the bells will be carefully landed and swung safe and sound into their position without accident.

Yours sincerely,

E. J. LENNOX,
Architect.



ENGINEERS' CLUB OF TORONTO.

The meeting of the Engineers' Club for November was held at the new club rooms which have recently been fitted up at 94-96 King street west. About thirty members were present. Reports of several committees were received.

Mr. T. B. Speight tendered his resignation as treasurer, owing to the fact that he expected to be absent from the city for several months. Mr. Canniff was appointed as his successor.

The following committees were appointed:

Finance Committee—Messrs. H. F. Duck, Jas. McDougall and A. F. McCallum.

House Committee—Major Gray, R. J. Parke, and A. B. Lambe.

Library Committee—Messrs. W. T. Jennings, W. H. Patton, and W. A. Clement.

A resolution of thanks was voted to the proprietors of the Rossin House for providing a room for meetings of the Club during the past year.

Notice was also given of several proposed amendments to the Constitution which will come up for discussion at the next regular meeting.

The Canada Asphalt Paving Company has been incorporated, with headquarters at Montreal. The capital stock of the company will be $50,000. The incorporators are Messrs. R. L. Dillon, J. St. G. Dillon and A. P. Dillon of Montreal, and James A. Pearson, A. W. Godson and J. H. Denton of Toronto.

METHOD OF CONSTRUCTING A WOODEN ELEVATOR.

The erection of a modern elevator is a task of no little magnitude, and entails many different principles of construction.

Though the steel framed elevator is now commonly used and seems to the architect of other modern build-

No. 1.—(A) Cement Piers. (B) Sized Lumber Piles.

ings, to be perhaps the only correct method of construction for such enormous erections, yet some of the largest elevators in the Dominion and elsewhere embody largely the simplest and earliest methods of construction.

The accompanying illustrations show very clearly this method of building—substantially that of the settler of the primeval wilderness when he puts up his log cabin.

This is one of the largest sized elevators, yet its builders claim for it advantages which, on the whole,

No. 2.—Shows Tratelling Cranes and Method of Erecting Trusses.

cannot be surpassed by any other character of building. It is much cheaper than the steel building in material, and its cost in erection is far below that of the other. Its rigidity is remarkable, and the dangers from side thrusts are entirely obviated.

Grain in bulk, wheat particularly, asserts great side thrust, being in reality a semi-fluid, and acting similar to water. A glance at illustration No. 5 will show how entirely this force must be overcome, the building being so bound together by its own divisions and bins as to be incapable of crushing, and bulging being impossible.

The illustrations are from photographs of the work upon the new I.C.R. elevator in St. John, N.B., and show very clearly the character of construction, method of operation, and, by the dates in the corners, the progress upon the work. This building was erected by Mr. J. A. Jamieson, of Montreal, who is perhaps the best known elevator builder in Canada, and has the reputation of being a most up-to-date contractor and designer in this line.

While the foundation was being prepared a mill was being fitted up with machinery immediately adjoining for the cutting up of the lumber into the various sizes required. This work was completed and the lumber

No. 3.—Sub-Timbeaing Complete—Planking just Begun. (A) Mill belonging to the Works. (B) Sized Planking. (C) Lumber Slides—fitted with Rolls

stacked in sized piles all ready for use before the construction began.

This method greatly facilitates matters, as the construction is proceeded with almost mechanically in its various stages.

No. 1 illustration shows one of the 98 cement piers in the foundation. No. 2 shows the character of the timberwork (Georgia pine) resting upon these, and illustrates the methods and simplicity of its erection.

The trains of cars are run into this lower part of the completed structure, and it also contains much of the machinery requisite to the elevating. From here up

No. 4.—Illustrating Sub-Timbering, Plank Mid-Structure, aad Timbering of Superstructure.

to what might be termed the clerestory, the entire structure is of 2x7 spruce planking, laid on the flat and spiked every few feet alternately near the opposite edges with 5-inch wire nails.

No. 3 shows the first few courses of this planking laid, and shows the lumber carriers, made up of a series of horses fitted with rolls, which may be seen more clearly in No. 5. The lumber is elevated to these

carriers at one end (the farther end in No. 3), and is then shoved along horizontally to its desired position. As the structure rises layer by layer, the carriers are elevated accordingly as often as necessary, being so designed that they interfere none whatever with the work, as is shown in No. 5. This is a peculiarly designed carrier and a most effective one.

No. 5 also illustrates the platforms for the workmen and the character of their supports in such a way as to be almost needless of explanation. The wedge brackets can support the platforms at any height as the work

No. 5.—(A) Wedge Brackets. (B) Wedge Brackets in Service Supporting Platforms. (C) Movable Platforms. (D) Lumber Slides in Position. (E) Rolls.

proceeds, and these are raised as fast as the planking rises.

Close inspection of the picture shows that cross and longitudinal layers of plank lap alternately. This view is taken at a height of 60 or 70 feet from the ground.

No. 4 shows the exterior of the planking when completed, the perpendicular lines being the ends of the cross planking. It is now ready for the galvanized iron covering which makes the outside finish.

A. B. Pickett.

Oct. 31st, 1900.

THE INTERCEPTING TRAP.

The Builders' Journal, of London, reproduces the correspondence lately published in these columns on the above subject, and comments thereon as follows :

"Our readers will probably be astonished, not so much at the diversity of opinion, as at the backward state of sanitation in our great colony which these reports appear to indicate. True, our sanitarians have not yet discovered the best method of ventilating sewers, for indeed ventilation, whether of rooms or sewers, appears to be the most difficult subject with which the modern engineer has to deal; yet we thought by this time it was a generally accepted principle that the house-drainage system should, as far as possible, be separated from the main sewerage scheme. But apparently the Canadian system in the past has been to ventilate the main sewers by means of "breathers" or gratings at ground level in the front gardens, and it is hardly surprising, therefore, that our Canadian confreres are desirous of altering a condition of things that is both dangerous and unpleasant. At the same time to make the soil pipe the means of venting the sewer air does not by any means lessen the danger, for only the water seals of the water-closets and gulleys prevent the ingress of sewer air into and round about the house. If, as several of the writers point out, the tops of the soil pipes are frequently choked by frost, any pressure of the sewer gas will force the water seals and enter the house. This new evil would probably be worse than the original trouble. If the sewers are to be ventilated, they must be ventilated below the disconnecting trap, so that no possible danger of sewer gas forcing its way into the house system may be apprehended.

ILLUSTRATIONS.

Sketch for Suburban Residence.—J. Rawson Gardiner, Architect.

Residence, Rosedale, Toronto.—Beaumont Jarvis, Architect.

Church of St. Clement, Brooklyn Avenue, Toronto. Bond & Smith, Architects.

Men-wah-tay Lodge, Rock Lake, O. and P. S. Railway. W. H. Watts, R.C.A., Architect.

AN ATTEMPT TO BRIBE ARCHITECTS.

The following correspondence has been forwarded by Messrs. Burke & Horwood, architects, of Toronto, in the hope that its publication may deter other manufacturers from adopting a like foolish line of policy. The words underscored were underscored by the United States firm who are the authors of the proposition.

(Copy).

Racine, Wis., 11—1—1900.

Messrs. Burke & Horwood, Toronto, Ont., Can.

Gentlemen: We note through the different contractors' journals, that you are designing and constructing many buildings. We believe there is much of mutual interest in our profession and line.

We wish to inform you and make you familiar with our entire system, so that in the planning and construction of your work you can recommend some of these devices which seem most practical, and for every building that is equipped through your recommendation and plan, you are to receive 5% on the contract price.

We would be pleased to have your views regarding this plan. We now have two or three hundred architects working with us, and we propose interesting the majority of the leading architects of the entire country. You can give us the name of the parties with whom you are dealing, or furnisbing plans, and we will correspond with and give them all the information possible, and with your consent refer them to you, as a disinterested party as to your views on the subject.

Hoping to receive a favorable expression from you, we are

Yours very truly,

Racine Fire Engine & Motor Co.

R. B. Sigapoos, Pres.

We are not members of the Fire Apparatus Trust.

(Copy).

The Racine Fire Engine & Motor Co., Racine, Wis.

Dear Sirs,—Yours of the 1st inst. is received, asking us for our views regarding certain statements in your communication.

In the first place, we have to state that you are making a great mistake in offering a commission. No reputable architect will have anything to do with such a proposition; it is entirely against all the best traditions of the profession.

Second—an architect who accepts such a commission cannot be a "disinterested party."

If your goods are what you claim for them, they should carry their own recommendation without the necessity of a bribe to the man who should, of all others, judge by the merits of the article he is recommending, from an entirely unbiassed standpoint.

Our advice to you would be to send out no more such offers to the profession, if you want to retain the good will of all right minded architects.

Yours truly,

Burke & Horwood.

Architect—"We've settled about the design for the drawing room. Now, as to the study; how do you want that finished?"

Nurox—"I seen in a newspaper once about a study in black and white that was very artistic. Suppose you gimme one o' them?"—Philadelphia Press.

NOTES ON THE FIRE AT PARIS, ONT.

In answer to enquiry, Mr. John Kay, architect, of Paris, Ont., has kindly supplied the following notes on the recent destructive fire in that town :

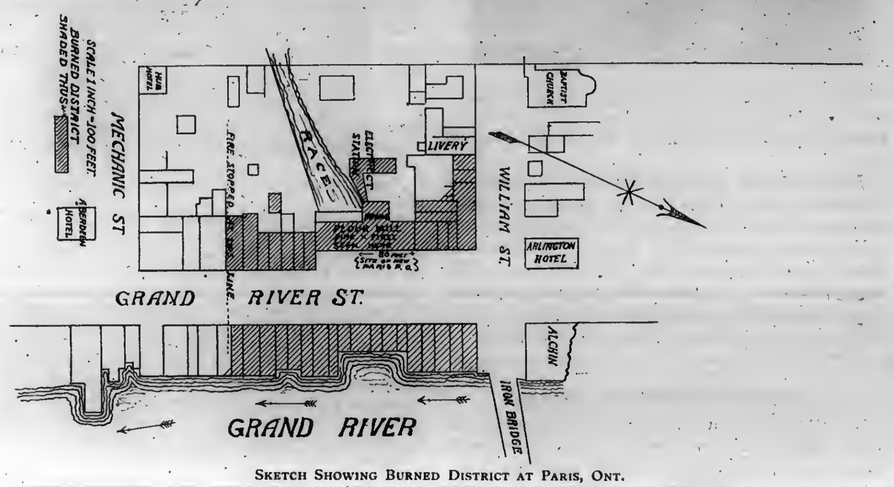
"As to our big fire on the 12th inst., it started in Mr. Meldrum's flour mill, a frame building 150 feet long by 45 feet wide, posts 30 feet high; posts 8 feet apart, 12 x 12 ; beams and posts in centre, 12 x 12 ; joists, 4 x 10 ; shingled roof with a cupola, 10' x 14', 6' high on top of ridge, with louvres which acted as a chimney. This caught fire, and in a short time the flames were everywhere—first breaking the glass and leaping up the clapboards. I never saw a better constructed fire with a gale from the west estimated at a 50 mile gait.

The fire blew across the street and the plate glass melted and ran like molasses. The stores along the east side of Grand River street were first class—some roofed with slates, but mostly metal (Garry iron) laid on tarred felt ; plate glass windows. Patton's hardware store was next the mill on the north side. Kegs of nails were fused into one solid mass. The embers flew across the Grand River, and set on fire the dwellings on the opposite side of river. The floor of William street iron bridge 130 yards long was on fire in many places ; a bucket brigade managed to save it. The mill in question was built 50 years ago and the building sites are few (the lower town where the fire occurred being in a hollow with hills around three sides and the river on the east,) and buildings were close up to the mill in front and on each side. The heat was so great that the water thrown with 80 lbs. per sq. inch seemed to go up in steam before it had a chance to put the fire out.

The town by-law forbids the rebuilding of such a structure as this mill. Brick and stone can only be used in walls. Paris previous to 1832 was called the Forks of the Grand River, since then it has been Paris. The mill in question was built in 1842 about 10 years before the railway reached the place. I am safe in saying that every building burnt on the 12th of September has been erected since the mill was built.

Paris has had fires in stores but the firemen managed to keep the fire within the walls where it started. In Randal's block there were three different fires without much damage to brickwork. This time, however, the lintels are so burned that the whole front will require to be taken down and rebuilt on new timbers.

Find enclosed a sketch showing position of burnt buildings. Already men are at work clearing out the cellars. Brick walls will take the place of lath and plaster partitions. Although lumber and hardware is dearer, money is cheaper. On the whole I am of opinion the fire was a blessing in disguise. A fine new Post Office, Custom House and Inland Revenue Building will occupy the site of the old mill. Pressed brick fronts with stained mortar will supersede the Princeton bricks. More vaults will be built—the contents of some of the so-called fireproof safes were worthless. Prism glass will be used to throw the light to the rear of the stores. The new buildings will have a proper grade corresponding with the centre of Grand River street. Before the fire the sidewalk would be level with the door sill of one building while next door the sill would be 8 inches above the sidewalk, and so on, giving the streets a very unseemly appearance.



SKETCH SHOWING BURNED DISTRICT AT PARIS, ONT.

PERSONAL.

The sympathy of a wide circle of friends is extended to Mr. John H. Tilden, president of the Gurney-Tilden Co., of Hamilton, who has recently been bereaved of his wife.

Mr. P. W. St. George, city surveyor of Montreal, has tendered his resignation on the ground that he can no longer put up with the interference and discourtesy of the Road Committee. Mr. St. George has been in the employ of the city of Montreal as deputy city surveyor and city surveyor for a quarter of a century.

STUDENTS' DEPARTMENT.

C. A. & B. STUDENTS' COMPETITIONS.

The publishers of the CANADIAN ARCHITECT AND BUILDER invite architectural students and draughtsmen resident in Canada to submit drawings in the following competitions:

STUDENTS' COMPETITION FOR A PORCH.

A plan, section and perspective sketch are required. Explanatory detail sketches of certain portions may also be included.

The subject is an entrance porch to a city house of 35 feet frontage facing south or east on a 50 ft. lot. The porch to be large enough for use as a verandah, and yet not to cover all the front windows, as it is desirable to have the sunshine enter the parlor by at least one window.

The porch may be of wood, brick or stone or combinations thereof and may have flat or sloping roof.

STUDENTS' COMPETITION FOR ENTRANCE DOOR, VESTIBULE AND VESTIBULE DOOR.

A plan, and section are required and elevations of both doors.

Explanatory detail sketches of certain portions may also be included.

The subject is the entrance from the above mentioned porch. Light may be obtained for the vestibule from a window on one of the walls not occupied by the doors, or from the entrance door or wall in which the door is placed.

The vestibule must be large enough to accommodate a fair sized hat rack and an umbrella stand.

Drawings must be made with pen and perfectly black ink on white drawing paper or cardboard. No brush or color work will be allowed. Drawings should be so arranged as to admit of photographic reproduction in the illustration pages of the CANADIAN ARCHITECT AND BUILDER. The size of each page is 7x10 inches. No set of drawings must occupy more than two pages.

Competitors must send in their drawings, prepaid, under motto marked "Students' Competition," and addressed to "the publishers of the CANADIAN ARCHITECT AND BUILDER, Confederation Life Building, Toronto," prior to 5 o'clock p.m. of the dates set for the competition, viz ; 1st competition, Thursday, 27th December, 1900 ; 2nd competition, Monday, January 28th, 1901. Each set of drawings must be accompanied by a sealed envelope bearing on the outside the author's motto and enclosing a card giving his full name and address.

The merits of the designs which may be submitted in in these competitions will be judged by a committee of the Ontario Association of Architects, whose decision shall be final. For the benefit of competitors, the judges will be requested to give a detailed criticism of each design.

Three prizes are offered in each competition as follows : To the winner of 1st position, $10 ; to the winner of and position, $5 ; and to the winner of 3rd position, one year's subscription to the CANADIAN ARCHITECT AND BUILDER.

The right is reserved to publish any or all of the drawings.

NOTE—Competitors are required strictly to observe and comply with the above instructions and conditions.

EXHIBITION OF ARCHITECTURAL DRAWINGS.

THE members of the Toronto Architectural Eighteen Club have made all arrangements to hold their first annual exhibition from January 26th to February 9th, 1901, at the galleries of the Ontario Society of Artists, King street west.

The above Club joined the Architectural League of America nearly two years ago and have been working on having an exhibition of American and Canadian drawings ever since. The success of the exhibition is assured ; not only has every American club promised to give every assistance, but also many of the leading architects and the following gentlemen have kindly consented to look after the Eighteen Club's interests in their various cities : Adin B. Lacey, Philadelphia ; N. Max. Dunning, Chicago ; Chas. D. Maginnis, Boston ; Edwin G. Gardin, St. Louis ; Gustave W. Drach, Cincinnati ; Julius F. Harder, New York ; John T. Comes, Pittsburg ; Percy Ash, Washington; Prof. Newton A. Wells, Urbana.

Beside the various drawings which the Eighteen Club will receive from individual architects and draughtsmen from the United States and Canada, there will be an exhibit of circuit drawings of the Architectural League of America consisting of about one hundred and twenty-five of the best drawings made during the year. An illustrated catalogue will be issued and distributed free to Canadian architects, and it is the desire of the Toronto Architectural Eighteen Club, that every architect in Canada will send in his name and address to Ernest R. Rolph, secretary, Bank of Commerce Building, King st. Toronto, as it is only through the medium of this publication that they can be reached, and for that purpose have inserted an advertisement on page vii.

The above Club is issuing a special circular with all information re this exhibition, along with invitations to all Canadian architects and draughtsmen to contribute drawings, and it is hoped there will be brought together the best collection of Canadian work ever seen.

THE TORONTO HOTEL.

THE announcement is made that the financial arrangements necessary to insure the erection of the proposed Toronto Hotel, have been completed, and that contracts for the construction of the building have been awarded. The plans for this important building have been prepared by Mr. Henry Ives Cobb, of Washington. The building will front on King, Victoria and Colborne streets, the main entrance being off King street. There will also be a second entrance off Victoria street. These entrances open into a rotunda 80x90 feet. The remaining frontage on both these streets will be fitted up as shops. The general dining room, banquet hall, assembly room and state apartments will occupy the first floor. On the succeeding five stories will be sixty bed-rooms with forty-two bath-rooms. The total cost of the land, building and furniture is placed at $1,500,000. Aside from the public need which this building will supply it promises to form an important addition to the architectural features of the city, and a help in maintaining values of business property east of Yonge street.

J. C. Killam & Co., of Moncton, N. B., who have secured the contract of strengthening, readjusting and covering the Memrancook bridge are now at work upon it. This firm makes a specialty of bridge building and have built quite a number in Nova Scotia and New Brunswick. They built the Long Creek bridge in Queens County, N. B., last summer.